



LIBRARY

RL

OF THE

Theological Seminary.

PRINCETON, N. J.

PER AS 472 .A84 v.8

Journal of the Asiatic
Society of Bengal



Digitized by the Internet Archive
in 2016

JOURNAL

OF

THE ASIATIC SOCIETY.

No. 92.—AUGUST, 1839.

ART. I.—*Note on the Mechis, together with a small Vocabulary of the Language.* By A. CAMPBELL, Esq. Assistant to the Resident Nipal, in charge of Darjeeling.

To H. T. PRINSEP, Esq.

Secretary to Government of India.

Ft William.

SIR,—With reference to my letters of the 13th and 20th ultimo, I have the honor to forward a few Notes on the Mechis, with a small vocabulary of their language, for the information of his Honor in Council.

I have the honor to be, Sir,

Your most obedient servant,

A. CAMPBELL.

Darjeeling, September 5th, 1839.

The Mech people inhabit the forest portion of the Turai stretching along the base of the mountains from the Burrumpootur to the Konki river, which leaves the Nipal mountains about 20 miles to the west of the Jechi River. In this tract they are respectively the subjects of the Nipalese, Sikim, and Bootan governments, occupying along with the Dindals—an allied tribe—and a few Garrows, a country of about 250 miles in length, having an average breadth of from 12 to 15 miles. In the eastern portion of the Nipal Turai they are but recent settlers ;

at Nagol Bundi, on the right bank of the Mechi river, there are about 20 families; at Kalikajhar about the same number; and, west from these places, in the thickest parts of the forest, there are several small colonies, amounting in all to about 150 or 200 families. In the Siki Turai, between the Mechi river and the Mahanuddi, there are about 400 families; to the east of the Teestah river, and in the Dooars Bootan they are still more numerous, and to this latter portion of the *habitat* they point as the original seat of the tribe, although its name would indicate its derivation from the Mechi river. I believe the Mechis are also to be found on the northern confines of Lower Assam.

The tribes immediately in contact and mixed with the Mechis, are the Koochias or Rajbungsi Bengalese, (whose original country is Kooch Behar,) the Dimals, Thawas, and Garrows. These neighbours of the hills are the Limboos, Kerantis, Lepchas, Murmis, and Bhotias; of these several tribes, I hope to furnish some particulars anon. As they associate much with the former, and frequently meet the latter at the frontiers, their habits and manners are naturally a good deal modified by the contact; still their peculiar usages, form of religion, language, and appearance, entitle them to the acknowledgment of their claim as a distinct people. They are fairer than the Koochias, and have little of the regular features of the Hindoo, which characterize that tribe. To the east of the Mechi countenance is strongly Mongolian, but accompanied by a softness of outline which distinguishes them readily from the more marked features of the same order—of the Lepchas, Limboos, and Bhotias. They resemble the Newars of the valley of Nipal, in complexion and feature, more than any other people I have seen or near these mountains; they are taller, however, and the fairer of complexion is entirely of a yellow tinge, whereas the Newars are frequently almost ruddy. Many of the Mechis strongly resemble the Mugs and Burmese in face and figure, and like them are much addicted to drinking spirits, smoking, and eating pawns. In common with the Assamese, they are fond of opium eating.

They never live on the hills at a higher elevation than 800 or 1,000 feet, and scarcely ever settle in the cleared and inhabited part of the Turai, but, keep entirely to the forest in which they make clearances, cultivating crops of rice and cotton with the hoe, and grazing buffaloes. The malaria of the forest so deadly to strangers, does not at all affect them; on the contrary, they are a remarkably healthy race, and do not shrink from visiting the plains, where they are subject to severe fevers. They have no towns, and rarely even live in permanent villages, generally quitting a clearance after having had two or three successive crops from the land, to take up their abodes in a fresh portion of the forest. In

ove respects the erratic habits of the Meehis resemble those of the Lawas especially ere that race commenced, as lately, to form permanent villages in the open Turai; and are identical with those of theimals.

The religion of the Meehis, in so far as they have any, is the Shivaite form of Hindooism, but it goes no further than to the occasional sacrifice—when they can afford a merry-making—of goats, buffaloes, pigs, and fowls at a clay image of Kali, when they drink spirits and a fermented liquor made from Murwa to excess, and indulge in much wantonness. The influence of the Brahmins is not recognised; they have no guroos, nor priests, nor temples; do not perform the shrādh; and bury the dead in any convenient part of the jungle, confining the obsequies to a feast among the relations of the deceased, and placing spirits and prepared food over the grave; tombs are never raised over the graves, nor have the small communities any common burying ground.

There is no distinction of castes among them. In the Nipal Turai the population of which is composed of the most varied assemblage of would-be Hindoos, and almost destitute of real ones, the Meehis are admitted within the pale, and water is taken from their hands by persons of caste, although they eat fowls, buffaloes, the cow—when beyond the Nipalese limits—and the carrion of all animals except that of the elephant, which animal is held in high respect by them, although not venerated, so far as I can learn. The carrion eating and other impure but cherished practises of the Meehis are not followed to the fullest extent in Nipal, where Hindooism is at a high premium, and breaches of the Hindoo law by all pretenders to that faith are punished with much severity. In Sikim and Bootan, however, the Meehis indulge their natural habits, and are as omnivorous a race of human beings as any in the world.

Marriages are contracted in youth or adolescence at convenience, the men purchasing their wives at prices varying from 10 to 60 Rupees, according to the beauty of the female and the means of the male. When an accepted husband has not the means of paying for his wife in money he joins her family party, working for the parents until he has fairly earned his bride according to previous contract; like the poorer classes elsewhere in India, a man can seldom afford to have more than one wife at a time, there is no restriction however on this head.

The women share equally with the men in all the labors of the field, and manage household affairs exclusively; they likewise attend at the periodical fairs (*Hauths*) selling, buying, and bartering the various

articles of home and imported produce. They are generally com and disposed to fleshiness ; the usual dress is a sari (robe) of red made of the "Indi" or thread of the silk worm which feeds on castor-oil plants, and their ornaments are confined to bangles and necklaces of white shell. The Indi silk is entirely a domestic manufacture, and wove by the women, who also color it with the lac dye. The Mech language has no written character, nor is it, I believe, all to the Sanscrit ; whether it is of Tibetan or Burmese extraction, akin to the aboriginal Indian dialects known among the Co Goonds, Beels, and other wild tribes, I am unable to say ; but perhaps the accompanying small vocabulary may enable competent persons to decide its root and original country. The Mechis are necessarily uneducated, except with a very few exceptions, in the Bengali language from which they have derived all the terms in use for articles common to a state of life removed from the savage. I regret, that I have not yet had an opportunity of meeting a person intelligent enough to give me some idea of the construction of the language ; this must remain for further inquiry. In the vocabulary I have omitted entering words for which the language has no equivalents of its own, except in a few instances, to prove the rule above noticed. All the words with Bengali fixed are evidently corruptions of Bengali or Hindi ; none of the Mech except "silver" and "iron" have names. There is no word for "money." Gender is designated by the affix of "Jilla" or male, and "Jeu" or female, for all animals but man.*

In the arts the Mechis have made but small progress, they exercise the care of their cotton agriculture, but as they grow only the common annual plant, the produce is not of a superior kind. Weaving is confined to the women as a domestic art. They are not addicted to trade, are averse to military service, have no artizans among them, are truly in a very primitive state of society. They are however very cheerful, have no jealousy or prejudice towards strangers, are industrious, and honest, and crimes of violence, so far as I can learn, are of rare occurrence among them.

A. CAMPBELL

* The names of the months and days of the week are Bengali, and the Mechis furnished me with the vocabulary are unable to give more than nine of the cardinal numbers in their own language.

VOCABULARY OF THE MECH LANGUAGE.

e, wad	tiger, meesāh
ater, dīce	bird, tausen
r, bar	the sun, kranondoong
e earth, ha	the moon, nokabur
one, yoontie	guroo, mōōsho
od, modie	hog, yoma
ther, appa	rice, myrang
other, aiè	paddy, mye
other, koî	cotton, rōon
der ditto, ada koî	blood, tye
ounger ditto, āki koî	flesh, mōōdun
on, bēēsha	hair, kumun
aughter, bēēsha hindon	teeth, hattye
uncle (paternal), adhii	eye, mōōkun
itto (maternal), amaî	nose, kōōntōōng
ousin (paternal	ear, kumma
uncle's son), phōōmbôî	head, koroh
wife, bihi	neck, kortunna
ouse, nau	mouth, koogha
aining, noka haioo	tongue, chulai
ree, bun phang	thorax, cherupa
ambo, wah	belly, udihi
attan, rydung	thigh, phenda
ron, shor	leg, yadii
ood, bon	foot, yappa
word, choongri	stars, hatoorki
nife, dlaba	clouds, jumai
ed, kutt	knee, hantoo
og, chēēma	finger, nāshima
elephant, megadett	nail of ditto, nashi kor
hinoceros, gandha	palm of hand, nakatulka
oat, borma	loins, janji
oad, lama	child, kataû
mountain, hajoo	old man, briebà
angle, hakea	young ditto, kōōkringindong
iver, dihi	ditto female, shikala
ool, bilōō	handsome, mōōjang
sh, nah	oil, taû
nake, jeebo	salt, shōónkri

pepper, banjóólóó	a man, manchi
maize, toomba	a woman, hinjan
to die, thibaî	plough, wayo
to sleep, móódóóbaî	cart, hoo
sit down, jhopîi	a bow, jeelcet
stand up, jhickat do	an arrow, bulla
go thither, oojhung tang	language, bhagia
come here, puki	a gun, shelaî
go quickly, kōōkri tang	table, phalla
lie down, moodoo no.	chair, kumpulai
shut the door, doowar phang	paper, lēka
go to the field, hooa tung	pen, kullum (H)
build a house, no lao	lock, [no word]
cut some wood, bon san	key, [ditto]
fetch some water, dīee labo	taut (coarse hempen cloth), phas
feed the child, koto jani ho	hemp, phāto
kill a fowl, tāoo shītuk	til (sesamum orientale), shibe
boil some rice, meekum chong	mustard, bishwar
light a fire, wad chāō	dal (pease), shobai
milk the cow, doodoo laboo	pawn, phātye
go to market, hattia tung	betel-nut, gwye
shoe, jotah (B)	lime, chūnye (H)
horse, ghorye (B)	brass, peetulye (H)
cow, mashujuh	silver, tais
buffalo, maishuo	a temple, modīe ne no (literal
door, doowar (B)	house of God)
ghee, ghu (B)	a flower, booibar
milk, doodu (B)	mangoe, tiekjo
sugar, chinee (B)	plantain, tali
turmeric, huldi (B)	ditto trec, lie phang
thunder, jumai homdung	lime tree, narengi phang
lightning, nophlambo	fruit, betū
cloth, (cotton) he	root of tree, rudda be phang
ditto of castor-oil insect, indi	branch of ditto, dalye
ivory, megadet hatye	leaf of tree, belye
horn, kong	a bridge, chye kong
hide, āboo	build a bridge, chye kong ka
hoof, yakong	make a road, lama yāw
tail, lanjye	a plain country, ha gēbang
wool, komun	the plains of Bengal, haien
a young elephant, megadet oodai	Bootan, aga phar
a grave, phokma	snow, hem

new falls, hem gooklindung	blue, goochum
stains, noka hidung	white, goophoot
warm water, goodung dýe	red, gujja
yellow ditto, gooshu dýe	yellow, koomoo
green water, dye ling ni	green, gangohu
black, gahum	black, koomum
white, húmma	

[No other Colors distinguished by names.]

father, bigoor	to swim, chanturri
matress, gondoo	cotton seed, koon tye
bootanee, kongar	ditto plant, koon phiang
Bengalli, hāshá	sugar-cane, kooshiar (B)
Mahomedan, tōōrōōp	a bear, moofur
priest or pujari, modie hōōis	wild dog, sheekoo
Nipalese, muggur	vulture, sheegoon
boat, nan	crow, taūka
single fowl, hangrūni dāusru	a well, dīre kor
male, jilla	blacksmith, kamar
female, jen	weaver, he daio
spirits, chao	hunter, mye kankea
large, ghidett	a spotted deer, kotia menbeang
small, udye	distiller, shoondi
fine, gujau	fine cloth, he goba
coarse, gahye	coarse ditto, he rujja
road, goo-ar	new ditto, he guddan
great man, grahi manichi	the sky, no krang
laugh, meniyao	above, chá
cry, dagup	below, eling
beat, shūtuknuh	to one side, chapin
be angry, brapmo	

Cardinal Numbers.

one, munche	five, munbha
two, munye	six, mundho
three, muntum	seven, munchini
four, munbre	eight, munjo kunnū

[No numeral beyond this]

right, hor	hard, guzia
cheap, chán	cheap, gair
dear, mās (B)	dear, kom
heavy, buruk (B)	heavy, eeliching
light, oofra	light, rujenchung

wet, ghichi
 dry, kran,
 beard, konkup
 moustaches, [no word]
 lip, kooshuti
 eyebrow, mooshu kor
 eyelash, moosheam
 good rice, mujang myrong
 sweet, kolan
 sour, kokye
 bitter, goká
 light, monabai
 darkness, komshibai
 raw, kotung
 boiled, komun,
 hunger, meenka honkia
 grass, jheekáb
 lame, nating kora
 deaf, kumma kanai
 dumb, ryeinga
 pain, sadung
 pleasure, moongu sagyi
 sickness, chobea jodung
 small pox, bontijaia

fever and ague, loomgaia
 rheumatism, beeshtong
 belly ache, yudichaia
 head ache, koro chaio
 purging, kābai
 to-day, dinisanchi
 yesterday, kapunsanche
 day before ditto, sombursanche
 the day before that, tamnepursane
 to-morrow, miasanchi
 outside, shetula
 inside, noh
 before, shekang
 behind, yeun
 quickly, kookei
 slowly, larhay
 a wall, jujoor
 a post, tongphang
 a beam, mandali
 a roof, mookoom
 a cooking pot, kanta
 a large ditto, mikamduh
 a water ewer, di heu
 a plate, toorsi

Example of forming feminine and masculine.

bull, moshu jilla,
 dog, cheema jilla,
 buck, borma jilla,
 tiger, meeshāh jilla,
 nephew, adye,

cow, mashu jeu
 bitch, chema jeu
 she-goat, borma jeu
 tigress, meesah jeu
 niece, anai

Sentences.

What is your name?	nunni mooa mamoo
Where are you going?	noo bujuntangul
Whence come you?	noo bujung prapaio
Where do you live?	noo nūa mongwhye
What is your father's name?	noong noorkpa mammo
Shew me the road to Pankabari?	Pankabari lama buriye
What is the name of that hill?	be hajoo māmoo
What is the price of rice at Dorjeling?	myrong sirifehe Dorgeling maelai

Names of Men.

Names of Women.

kla,	Phagooni,
ka,	Bisaje,
asache,	Bisahawa,
inga sache,	Furgunnie.
joon,	
ula,	
aroo,	
ti,	
ti tokla,	
edla,	
uta.	

A. CAMPBELL

T. II.—*Researches on the Gale and Hurricane in the Bay of Bengal on the 3rd, 4th, and 5th of June, 1839; with reference to the Theory of the Law of Storms in India.* By HENRY PIDDINGTON.

PART II.

That the hurricane part of the tempest which we are considering is blowing in tolerably well defined circles, has been, I think, clearly shown in the foregoing part of this memoir. The object of this second part, is to adduce evidence, which shews that it was at the same time both a *gale*, i. e. a strong wind blowing in with tolerable steadiness from one quarter of the compass; and a *hurricane*, namely, a violent wind blowing in a circle or vortex of greater or less diameter. At present too it seems probable, from the dates, that the gale produced the hurricane. We may consider that this storm was one of those which usually occur at the change of the moonsoon from NE. to SW., which in various parts of the Bay may be said to take place between the 15th May and 15th June. It is from the 1st to the 15th June that we look for the rains in Calcutta, though sometimes, as in this year, they may be said to have begun in April. It will be borne in mind then, that whatever follows, whether facts or hypotheses, relates only to the beginning of the SW. monsoon. Future observations will inform us, whether the October Gales as they are called,—though they sometimes occur in November,—are subject to the same or different laws. (The European reader will recollect, that October is the epoch at which the NE. monsoon takes the place of the SW. one.)

If we look at the Bay of Bengal, Map No. II, we shall be struck with the fact, that while it is bounded on the East by the mountain range which stretches from the Malay peninsula to Bootan, often approaching very near the shores, and rising to the height of from 3000 to perhaps 5000 feet on the Arracan coast; it is also bounded, on the West, by the Coromandel range, which supports the Eastern side of the elevated table lands of the Deccan. At the valley of the Mahanuddee (the river of Cuttack) however, at its junction with the Vindiya range, it turns suddenly to the North-Westward and Westward, leaving thus between it and the mountains of Arracan, the great opening from Point Palmiras to Chittagong, which, to use an orientalism, is the *gate* to the plains of Bengal.

The salient angle, formed by the corner where the Vindiya and Coromandel ranges meet, and the entering one, where the Bootan Himalaya, and Arracan and Cachar ranges join (leaving however the valley of Assam as an opening for the great Burrumpooter to pass through,) thus form, as it were, an angular channel; through which all the lower strata of the current of the SW. monsoon may be supposed to find their way over the plains of Bengal and up the valley of the Ganges; and this is their natural course. But we may suppose that the SW. monsoon when urged to any great force at the mouth of the Bay, about Ceylon, must strike against the mountain ranges of Arracan in about from lat. 16° , which is that of Cape Negrais, to lat. 20° or 21° ; or about that of Arracan; and, being deflected thence, must follow off in a paraboloidal line towards the great opening offered by the low lands at the head of the Bay, and thence proceed up the valley of the Ganges as before.

But when the head of the Gale is thus deflected, it may meet also with that portion of the monsoon which has blown along the Coromandel range and coast—called the “long-shore wind,” by the old navigators—which has a much shorter distance to travel; and there occasionally forms an eddy of variable winds, whirlwind or hurricane, according to the force of the first impulse—and this again influenced too, doubtless by many causes to which we are yet strangers.

If this theory be true for these tempests, we should look to the points, about the meeting of the two currents, varying in position according to their respective forces, at which, during these gales, it should be comparatively calm, or blowing but moderately; and it is curious that at Balasore, in latitude $21^{\circ} 28'$, and at the Black Pagoda in $19^{\circ} 62'$ N. this comparative calm is found to have existed. My authority for this is the following letter.

Balasore, July 31st, 1839.

DEAR SIR,—I should have been much at your service in giving you all the requisite information concerning the gale here, had any taken place, but we had only strong gusts of wind at NE. to SE. with uncommon heavy rain on the 5th, 6th, and part of the 7th of June, which even to this day has kept back the rice crops. The thermometer fell to $81\frac{1}{2}^{\circ}$, and unluckily my barometer was broken a few days ago, so that we could only foretell a gale coming on by the blackness of the heavens to the Eastward; which gale did not reach from the Northward of Point Palmiras to Balasore, but blew hard from Point Palmiras to below Pooree to the Southward. No vessels were lost in the Balasore roads; but to the Eastward they may have been lost, as a Malingah topgallant mast was picked up, besides pieces of deal boxes, supposed to have contained glass-ware, marked "*Protector*," which vessel was lost to the Eastward, between the reefs, last October.

Gales at Kedgerree, though blowing dead to windward of us, distant twenty-five miles, do not always reach this coast; as in the May Hurricane of 1833, when the "*Duke of York*" was blown from her moorings at Saugor across to Hidgelec, and became a wreck, yet the gale did not reach here, although the bank to the Eastward in the heavens so plainly indicated a gale, that every person here barred up their doors and nailed them. We only had a good topgallant breeze.

The Neilgherry Hills appear to influence the winds much on the coast north of Point Palmiras, as the winds are generally throughout the SW. monsoon, SW. to W. in the morning to 7 A. M., veering round to S. and SE. P. M.; and in the NE. monsoon, W. to NW. veering round to NE. after 8 A. M.

(Signed) A. BOND.

Mr. Richardson, Branch Pilot, informs me, moreover, that during the fury of the Gale of 1833, in which the "*Duke of York*" was wrecked, and he himself was driving about with all his anchors down, some passengers whom he had previously landed at the Black Pagoda were upon the top of it, and felt no excessively violent wind, though they saw the horizon very black, and the sea dreadfully agitated to the North Westward of them.

The slow rate at which our vortices travel onwards is very remarkable, but seems, if future observation should confirm it, to afford countenance to this theory; for, as before said, we may consider them as pent up between the current passing round the vortex of the parabola and the promandel range; and no doubt to feel, as water in similar channels would do, the repulsion from these last. It is clear, as shewn in p. 576, by the log of the "*Indian Oak*," that the monsoon was blowing up along the coast as far as Vizagapatam, from between which and Gan-

jam, to Point Palmiras, the Hurricane was probably felt. Its limit to the North we well know to have been between Point Palmiras and Balasore, but I could obtain no intelligence from Ganjam to fix a limit to the South.

We should also find that, as the current of air proceeds up the valley of the Ganges to the North Westward, it should give rise to an Easterly Gale, which has also in this instance occurred, as will be seen from the following extracts, the first being from a very able and interesting letter from Mr. Ravenshaw, of the Civil Service, dated Chuprah Behar, lat. $25^{\circ} 46'$ N. long. $84^{\circ} 46'$ E.

Chuprah, July 17th, 1861

DEAR SIR,—Having observed in the Newspapers that you are desirous of obtaining information connected with the Gale which occurred in the Bay of Bengal from the 3rd to the 5th June inclusive, I have the pleasure to contribute my mite to the stock of facts which you are engaged in collecting. The enclosed extract from my Register will shew the height of the Bar. and Ther. at $10\frac{1}{2}$ A. M. during the Gale, and for some days succeeding it. I regret that my official duties prevented me from taking observations at $4\frac{1}{2}$ P. M.; but I hope the small amount of information afforded will not be without use, shewing the direction and duration of the Gale of this district, inland from the Bay of Bengal. It will be remarked, that the Gale did not commence here until the 4th instead of the 3rd June, and that it terminated on the 7th instead of the 5th. The Bar. kept falling during the continuance of the Gale, and strange to say did not reach its minimum until the day after the violence of the Gale had ceased, i. e. the 8th. The direction of the Gale was nearly due East, but on the 8th the wind shifted to the SW. and West, and on the 9th blew furiously from the latter quarter as it had previously done from the East; towards evening, however, it shifted to the NE. On the 10th it changed to SE., on the 11th to SW.; and the following day to the West. On the 14th and 15th it again veered to the NE. and EbN. until on the 16th it resumed its old position of East, which is the usual direction from which it blows at this season of the year. From the above it would appear that the wind, after the violence of the Gale had subsided, acquired a rotatory motion and turned round the compass in a Southerly direction before it recovered its equilibrium. By letters received at the time from Mootebarry, 60 miles North of Chuprah, and from Gyah, about 90 miles South of the station, I learnt that the Gale occurred with equal violence at those places. The breadth of the column of air put in motion was therefore at least 150 miles, and probably much greater. It would be interesting to ascertain the exact limits of this Gale inland as well as at sea, which object might be effected by your addressing a circular letter to the residents at each of the principal stations in the Western Province, e. g. Allahabad, Cawnpore, Agra, Delhi and Saharunpore. I

information from these points would probably give the extreme length which the Gale extended, as information obtained from Jubbulpore, Calcutta, and Ajmere, would shew the extreme breadth. I do not collect at present from what direction you stated the Gale to have blown in the Bay of Bengal, but if from the SW., the usual course of the monsoon, it is difficult to account for its blowing here from the West, unless we suppose the column of air to have been driven against the Assam and Himalaya Mountains, and by them turned in a westerly course. In this event, it is probable that the Gale may have subsequently followed the direction of the mountains NW. perhaps as far as Hurdwar.

I conclude that it is not your intention to confine your observations to inquiries to the Gale under consideration, but to all storms of magnitude in the Bay, or its vicinity. The Gale which seems to recur almost annually in the Bay of Bengal in the month of October, would, from its regular recurrence, form an excellent subject for observation. It was felt at Chuprah during the two years that I have been stationed here. On the first occasion it blew (to the best of my collection) from the East, whereas last year it came from the West.

It appears to me very desirable that either Government or some public body like the Asiatic Society, should take measures for securing an uninterrupted official record, not only of the periodical and occasional storms which extend generally over large tracts of country, but also of local atmospherical peculiarities—the changes in the direction of winds and storms occasioned by mountains and the larger rivers—also of the general character of the seasons in different parts of the country—the paucity or abundance of rain—the minimum rise of the Ganges, Burrumpooter, &c.—the price of grain as affected by the seasons—the date of the commencement and termination of the rains—of the hot winds—or of any other prevailing winds.

The Asiatic Society through its numerous members might, I could imagine, without difficulty obtain information on the points alluded to from all the principal stations in India, which should be annually digested and published in their *Journal*. These again will be compared and generalized every 10 years or so by a Meteorological Committee of the Society. The Asiatic Societies of Madras and Bombay might be requested to adopt the same system throughout their respective Presidencies, so that the observations might embrace the whole of India. Such a combination of laborers in the cause, and the consequent accumulation of facts, assisted by the rapid progress of science in these days, would almost justify the hope that we may ultimately arrive at the discovery of some general laws by which the seasons are regulated; and by which we may be able to foresee and guard against both inundation and famine, in a country where their ravages are often so destructive to life and property.

(Signed)

E. RAVENSHAW.

1839.	Bar. at 10 $\frac{1}{2}$ A. M.	Ther. attached	Bar. at 4 $\frac{1}{2}$ P. M.	Ther. attached	Bar. at 10 P. M.	Ther. —	Remarks.
June 4th	No observation.		Strong and con- tinued gale from East, with occa- sional rain. Rain; wind S.W. shifting to West. Ditto, W. do. to N.E. Ditto, Wind S.E. Ditto, S.W. Ditto, W. Ditto, W. Ditto, N.E. Ditto, E.b.N. East, the usual di- rection of the wind at this season.
5	29.50	86	....	....	....	....
6	29.42	86 $\frac{1}{2}$	....	....	....	....
7	29.32	83	....	....	....	....
8	29.30	84	....	....	....	....
9	29.34	81 $\frac{1}{2}$	29.32	82 $\frac{1}{2}$	....	....
10	29.40	82	....	....	....	....
11	29.39	83	....	....	....	....
12	29.38	85	....	....	....	....
13	29.38	85	....	....	....	....
14	29.47	87	....	....	....	....
15	29.58	87	....	....	....	....

N. B. This gale extended in *breadth* from Mootebarry, 60 miles North of Chuprah to Gyah, 90 miles South—and perhaps further, but of this I have no authentic intelligence.

As far then as our present knowledge extends, and referring to the state of the Gale in the Southern part of the Bay, we find that the impulse, which may be said to begin to be violently felt on the 31st by the *Susan*, did not reach Chuprah till the 4th, when it produced a Easterly Gale, terminating on the 7th, shifting to the South-West and West on the 8th; the counter-gale and eddies, if we may so call them being only the irregular movements of the various currents produced by this great derangement of the usual equilibrium of the aerial current which, as is remarked, are usually from the East at this season; affording also a proof towards the theory which I have ventured to offer. When the monsoon slackens the Southerly and South-Westerly gales, and currents may find their way as far inland as this place. The dates show that the Gale did not begin at the point to which it blew, but that it was a progressive impulse travelling about the direction which we have laid down. Assuming this theory as a *guide* only, let us now see how it accords with the facts we already possess here. By referring to the Map, No. II. we see that though along the coast from Madras to Vizagapatam, by the Indian Oak's log at Masulipatam, by the Master Attendant's report from Coringa, and up to the 3rd at noon by the Laurel Amelia's log, it was fine, though threatening; yet from the 31st May to the 5th June, by the logs of the Lady Macnaghten, Petrel, Susan, Jumna, and Laurel Amelia—to which too we might add those of the Nine, Eden, and Mobile—a severe gale was blowing between W.S. and S.W. diagonally across the Bay, in lines about parallel to one drawn from the centre of Ceylon to Cape Negrais, the termination of the Arracan coast. We find that at Cheduba on the



Itinéraire
dans l'Afghanistan

fait dans le courant de l'année
1826

— PAR —
A. Court

Ancien Elève de l'Ecole Militaire de St. Cyr.





1, and part of the 3rd, the John William Dare had a severe gale from S to SSE. the gale being then deflected by the mountains of that part. At the harbour of Akyab No. 27. we find that our meagre notices give us "Easterly winds with hard gales" on the 2nd; on the 3d, and 4th, "brisk;" on the 5th, "gales;" and on the 6th, SW. winds.

At Dacca* Dr. Lamb's Register gives as follows:—

	Winds.	Bar. 10 A. M.	Ther. Noon.
1st.	SE. East SE.	29.68	90
2nd.	SS. East,	„ 61	90
3rd.	East South SE.	„ 61	91 3 inches of rain.
4th.	East SE. South,	„ 68	88½ 6 inches of rain.
5th.	South SE. SbE.	„ 71	85

that here the winds were varying between South and East.

At Jellinghee, in lat. 24° 8', long. 88° 42' E. about 140 miles WbN. Dacca, and about 100 NbE. of Calcutta, at the spot where the river that name branches off from the great Ganges, a memorandum informs me as follows:—

June 6th, strong Easterly gales with frequent showers.

„ 7th, ditto ditto.

„ 8th and 9th, Frequent showers and cloudy weather.

The following is an extract of a letter and memorandum from H. B. Purneah, Esq. Deputy Collector, Purneah.

"The observations from 4th to 10th inclusive, in the following memorandum, were made on the Ganges, some miles south of Purneah—at least so I understand Mr. Palmer to say:"

Transcript of Extract of Day Book, 1839.

1st.	Wind E. blew hard and rained in the morning.
2nd.	Wind E. a warm clear day.
3rd.	Wind E. clear morning, rained heavily in the afternoon, and blew hard from South at night.
4th.	Wind E. blew fresh.
5th.	A strong gale from the East—rained a great deal—a wet rainy night.
6th.	Blew hard the whole day from the East, and squalls accompanied with rain came frequently.
7th.	Wind SE. in the morning—East at noon; died away in the afternoon, rained a little.
8th.	Wind S. and SE.
9th.	Wind East—rained a great deal and blew fresh.
10th.	Wind ESW. and E. again—rained a great deal.

* The Indigo planters of the district of Dacca and the Eastern part of Jessore are well aware of the tendency of strong Easterly winds to cause rapid rises of the river, and severe loss to them by inundating their plant. If we suppose the Easterly gale to be a Southerly and South Westerly one in the Bay, we obtain an additional reason for this, the common one of the Easterly gale being partly against the current of the Ganges; i. e. the waters of the ocean are driven up into the NE. corner of the Bay.

"The inclosed notes I made in original, and regret not having in my power to comply more fully with your request."

June, 1839.

- June 1st. Light airs from NE. to E. cloudy at times.
 2nd. Ditto, Ditto.
 3rd. ENE. cloudy, or slight showers from ESE.
 4th. Ditto, ditto light fresh breezes with slight showers.
 5th. Heavy ENE. wind, very cloudy with light showers.
 6th. Ditto ENE. with constant sleet and rain.
 7th. Heavy ENE. with sleet, wind veered S. to SSE. occasional showers.
 8th. Heavy ENE. veering round to South with rain—night, Northerly.
 9th. Fresh ENE. cloudy with heavy showers.
 10th. Rain almost all day—clouds flying from East—Light airs from West. great deal of rain has fallen, the nullahs rising very high, threatening overtop their banks.*

At Ghazeepore lat. $25^{\circ} 35'$ N. long. $83^{\circ} 33'$ E. and 41 miles East Benares and 84 miles W. $\frac{1}{2}$ S. from Chuprah, Dr. Jackson kindly forwarded me a journal for the month of June, from which the following is an extract, which I copy to the 11th, to shew how remarkably they agree with those of Mr. Ravenshaw from Chuprah, in the sudden change of the wind, from ESE.—which we may call its average from the 1st to the 7th,—to SW. on the 8th. The subsequent changes seem to indicate, as before said, that the more direct current of the monsoon had for a short time forced its way upwards; for the remainder of the month the wind is variable from E. to W. with sultry weather, as usual then in the month of June.

Date.	Winds.	Ther.	June, 1839.—Remarks, &c.
1	ESE.	98	Pleasant breezes, fair weather, 11 A. M. cloudy with a few drops of rain, hot and sultry.
2	ESE.	98	Light breezes, fair weather, hot and sultry.
3	ESE.	99	Fresh ditto, cloudy, at intervals hot and sultry; at 1/30 P. M. squall, no rain.
4	ESE.	96	Fresh breezes, cloudy at intervals, with hard squalls, fair weather.
5	ESbE.	92	A. M. cloudy and showery, hard gales with showers at intervals
6	SEbE.	86	Hard gales, dark cldy. weather, showers at intervals, night rain
7	SEbE.	86	Ditto ditto ditto with heavy rain, 7 P. M. wind shifted to the SW.
8	SW.	80	Dark cloudy rainy weather, with hard squalls of wind, 6 P. M. fair and continued during night.
9	SW.toESE.	80	Morning dark, cloudy and fair, which continued throughout, P. M. wind shifted to the ESE.
10	ESE.	84	At 3 A. M. dark and cloudy with drizzling rain, at 5 fair moderate breezes.
11	WSW.	88	A. M. dark and cloudy, with thunder, lightning and rain, at fair moderate breezes, passing clouds.

GHAZEEPORE,
September 14th, 1839.

J. JACKSON,
Civil Surgeon

* In the Northern parts of the district much more rain fell, both the Coosey and Mahanuddee were uncommonly high for the time of the year.

From Gorruckpoor, in lat. $26^{\circ} 45'$ N. long. $83^{\circ} 22'$ E. I learn by one
 er that it blew a gale from the East on the night of the 5th and 6th
 he; strongly from the East during the 6th, and until the afternoon
 the 7th, when it was NE., also blowing strongly; on the morning of
 8th it was NW. strong, and towards the afternoon it shifted to the
 st and moderated. The rain commenced at noon on the 6th and con-
 ued night and day till the afternoon of the 8th, when it ceased.
 From Gorruckpoor I have also by the kindness of Mr. Vears the
 following memorandum.

Gorruckpoor, 23rd September, 1839.

At the request of Mr. Bridgman, I send you an extract from my
 eteorological Journal, it is a very unfortunate circumstance that I
 ould have neglected to register the barometer and thermometer until
 e 7th of June, I however, noted the direction of the winds and the
 aximum of the Thermometer, which is better than nothing, and
 haps may answer your purpose; there was a storm from the East with
 n on the 31st May.

Yours sincerely,

N. VICARS.

10 A. M.				1 P. M.				Remarks.	
Bar.	Alt. Ther.	Detch.		Bar.	Alt. Ther.	Detch.		A. M.	P. M.
Max.	of	ther.		91.4	min.	89.2		Estly. moderate, none.	Easterly.
Do.	....	Do.		91.2	....	....		Easterly (minimum of Bar. 28.873)	None.
Do.	....	Do.		92.0	....	....		Easterly, moderate.	Storm rain, no wind.
Do.	Do.	....		91.5	....	....		Easterly, strong.	Easterly, strong.
Do.	Do.	....		88.0	....	....		Easterly, showers.	Easterly, strong.
Do.	....	Do.		86.0	....	....		Easterly, stg. hvy. rain (min. of Bar. 28.808)	Easterly, strong.
28.970	....	81.0	28.750	....	80.0			Estly. stg. rain all day.	Easterly, strong.
28.788	77.5	78.5	28.777	79.5	77.8			Easterly, strong, heavy rain till 4 P. M.	Easterly, strong.
28.902	80.7	80.2	28.910	...	81.0			Easterly, strong, cloudy.	Easterly.
28.961	81.0	81.0	28.800	82.8	83.0			Easterly, cloudy.	Variable.

From Mirzapore lat. $25^{\circ} 10'$ N. long. $85^{\circ} 35'$ E. I am indebted to
 r. Stuart for the following memorandum of the weather, from 1st to
 th June, 1839.

June, Thermometer,	..	88.	..	Fresh Easterly Breeze.
ditto,	..	86.	..	Morning wind Easterly. Noon dreadfully hot and blowing strong from the NW.
ditto,	..	90.	..	Not a breath of wind, until 6 A. M.
ditto,	..	88.	..	Sultry night—strong Easterly wind.

5th ditto,	„	..	87	..	Blowing heavy from the East, showers, n blowing very fresh and weather wild looki
6th ditto,	„	..	80	..	A regular gale from the East with drizzl rain, noon gale increasing and more ri evening stormy and wet.
7th ditto,	„	..	80	..	Severe squalls through the night from East with heavy and incessant rain, n blowing heavier, rained more Northe evening raining very hard.
8th ditto,	„	..	80	..	Very wet morning, cleared up about nine.
9th ditto,	„	..	80	..	Gloomy morning with distant thunder.
10th ditto,	„	..	80	..	Heavy Squalls through the night, torrent rain, cleared up at 8 A. M. noon close, c and sultry.

My attention was drawn to this theory while endeavouring to trace some barometric curve, and some relation between it and the magnetic equator,* and withal some law which might theoretically account for the paraboloidal course of the West Indian and American hurricanes as shown by Mr. Redfield and Col. Reid; and the singular differences shown by the track of our Hurricane led me to suppose that it might perhaps move in the axis of the parabola? Mr. Ravenshaw's letter shortly afterwards gave much credit to these views, and subsequent facts serve to justify our asserting that for this time at least it is done so.

If we describe, as I have done on the Map No. II, a great parabola one branch of which stretches towards Ceylon, and the other up to the valley of the Ganges towards Agra, the vortex being towards Arrac and the axis in the line of the supposed track of the Hurricane; it will be found that the focus of such a parabola falls in about lat. $19^{\circ} 36'$ long. $88^{\circ} 10'$ E. which was about the centre of the Hurricane on the 4th. These sort of lines are of course arbitrary, but still the coincidence is novel and curious; whether we look upon the whirls of the Hurricane to have been produced by the mere dynamic action of streams of air, like the eddies within the bends of a river flowing through a curved channel, or suppose that these vortices are Thermoelectric Phenomena, produced by the sudden transfer of great volumes of the caloric and moisture of the stream of air from the warm equatorial regions to the colder ones toward and beyond the tropics. The marks on the warmth of the weather in the logs, and the thermometric

* It may be worth remarking that while this hurricane seems to have travelled from East to West or nearly parallel to the direction of the Magnetic Equator as laid down by Biot, those of the West Indies seem for the most part to come from the South Eastward, which is also there the direction of the plane of the Magnetic Equator. "Raleigh's" Hurricane in the China Seas seems too to have travelled in this direction.

aster, with the peculiar state of the atmosphere so well described in the remarks of Captain Paterson, of the H. C. S. *Amherst*—and her track from Akyab we must remember was almost in the direction of the path of the hurricane till it overtook her at the Sand Heads—are all worth considering.

These are but vague theories, it will be said, but it will not be forgotten that theories on a new subject, like torches in exploring dark caverns often lead us to the passage we seek; though not by the road we expected. "We have only to be ready to lay them aside when they have served our turn,"* and if I venture to introduce this one here it is to point attention to the importance of obtaining electric observations if possible.

The slow rate at which the vortex appears to have travelled also seems to show, as before remarked, that it was, as it were, pent up between the great stream of air blowing along the Arracan range and the Coromandel Hills. We see analogous instances to this in the small bays at the sides of rivers, where while there is one part of the stream turning round the corners of it and another flowing from point to point, we see the eddies from time to time found almost stationary about the middle of the bay.†

I wish to be understood here however as suggesting probable comparisons rather than advancing a theory.

Col. Reid and Mr. Redfield give from ten to thirty miles per hour for the rates at which the centres of their different vortices have probably travelled onwards. If our centres are correctly laid down; and I think there is good evidence that at least those of the 4th and 5th are so; it appears that from the 3rd to the 4th the Hurricane travelled onwards only about 100 miles, or say 4-16 per hour, and from the 4th to the 5th about 70 or 83 miles per hour. This again is conformable to what we observe in the bends of a stream where the eddies seem to start from one point, and move onwards with more rapidity in the first part of their course than latterly. Should future experience confirm this instance of the slow progress of our Hurricane, it will become an important element in any calculation to be made by the seaman for avoiding their violence.

Sir John Herschel.

In the rivers of India banks are often formed at these points, which ending by blocking the stream as the river becomes lower, changes its channel in succeeding years.

Practical Remarks and Deductions.

I have quoted at p. 563 an opinion expressed in my hearing, that was thought by the individual that "they would not make much of it." Few I think who have perused the preceding pages, will be inclined to repeat this, but still as the plain man and the practical seaman may not so readily arrive at *all* the conclusions to be drawn from the knowledge we have collected of this single tempest, I have been induced to sum them up here.

My original intention was to delay doing this, and even the publication of this memoir, until I could collect also what was to be gleaned from the records now existing of our former gales and hurricanes, and then accompany the whole with practical deductions; but it was suggested to me by Professor O'Shaughnessy, that by the delay which this would occasion, we should lose the opportunity of exciting public attention to the subject before the approach of the autumnal gale, and moreover, that even by publishing our knowledge in this yet imperfect state, we might nevertheless, possibly, avert mischief. This thought sound counsel, and therefore propose to make our former Indian tempests the subject of a future memoir.

It will then be recollected that what is here said is merely the amount of our *present* knowledge, and that what is said is rather meant as a suggestion than as a rule. I shall however distinctly state the grounds from which the various inferences are drawn, and it will be for every man to exercise his own judgment thereupon; I shall also acknowledge when I borrow from Colonel Reid, or other writers.

Clearly to comprehend this theory of gales and hurricanes, let us begin with the *words*. As I have elsewhere said, the words are not to be used so much with relation to the force of the wind in a storm, as to its motion.

A *storm*, or tempest, may mean either a Gale or Hurricane, but always means a storm of *wind*, and not, as frequently used by land men, one of thunder and lightning only; unless so expressed.

A *gale* means a storm of wind, the direction of which is tolerably steady for a long time, sometimes not only for days but for weeks.

A hurricane means a *turning* storm of wind blowing with great violence, and shifting more or less suddenly, so as to blow half entirely round the compass in a few hours.

With this explanation of our words we shall better understand the things treated of.

The present state of our knowledge seems to show that for the West Indies, Bay of Bengal, and China Sea, the wind in a hurricane

is two motions, the one a turning or veering round upon a centre, and the other a straight or curved motion forwards, so that it is both turning round and rolling forward at the same time. It appears so that it turns, when it occurs on the North side of the Equator from the East, or the right hand, by the North, towards the West; or *contrary* to the hands of a watch; and in the Southern hemisphere, that its motion is the contrary way, or *with* the hands of a watch. The foregoing memoir with the charts and diagrams shew that this rule holds good at least for our storm of June last; and that the wind was really blowing in great circles in a direction as described; i. e. against that of the hands of a watch. We assume then for the present, that the hurricanes in the Bay of Bengal *always* follow this law. We do not yet positively *know* that such is the case, but it is the most probable opinion.

If we describe on a piece of paper a few concentric circles, like those in the diagrams, and marking a little compass with its *fleur de lis* to the North in the middle make four arrows at the top, bottom, and two sides, writing against them as in the diagram, East-wind, North-wind, West-wind and South-wind, and then cut this out with scissors, we shall have what is called a *Hurricane-circle* or *Hurricane-card*.

The use of this is to lay it down upon any part of a chart. We may also cut out a little spindle-shaped piece to represent our ship, and place this in that quarter of the card at which the wind is found.

The card may be supposed to represent a circle of fifty or of five hundred miles in diameter, as we please; and one which would fill up the head of the Bay of Bengal would show, on our map No. II, the wind South on the Arracan coast, East at the Sand-Heads, North on the coast of Coromandel, and West across the Bay.

We have now to judge of three important points, What is the track of the hurricane if it is to be one? In what direction does it bear from us now? How far are we from its centre?

We do not yet know what is the usual track of our Indian hurricanes. We know from Col. Reid's and Mr. Redfield's researches that those of the West Indies begin about the Leeward Islands, travel to the WNW. and then round the shores of the Gulf of Mexico, and following the Gulf Stream, are lost in the Atlantic between the Bermudas and Halifax; and they have investigated a sufficient number to show that this may be taken as a general rule. Those also of the Mauritius seem to come from the Eastward. All we yet know positively here is the course of this single tempest; and hence the great necessity of further observation and research, to which I shall perhaps farther allude. We may however, in the absence of better knowledge, take it as

a supposition, that the hurricanes in the Bay of Bengal travel from the Eastward to the Westward,* and it may be quite safe to calculate upon their blowing in a circle from right to left.

We must then *assume* this point, and supposing we have the wind at ESE. we are then *somewhere* upon the line leading from the NNE point of the hurricane-circle to its centre.

If the wind now veers to SE. and SSE. we can easily understand that the centre has passed somewhere to the Southward of us, and that we are upon the *right* hand side of its track.

But if the wind had begun at North, and veered to the N. West and West we can also understand that the hurricane is passing somewhere to the Northward of us, and that we are upon the *left* hand side of its path. At what distance we are from the centre can only be judged of by the quickness with which the wind veers round; and it will be clear that if a ship stood exactly still with the hurricane coming direct towards her, she might have the wind always in one direction till the centre passed her, when she would probably have a shift exactly in the opposite direction.†

The seaman will now understand how it is that he may be running into a Hurricane or scudding in company with one—which no one of course desires to do—and how important it is that a knowledge of their usual paths should be obtained; for they seem to have in all countries tracks which we may call their usual paths.

As an example how a vessel may run into a hurricane, let us suppose upon our Chart, the Amherst, bound across the Bay from Chittagong to Coringa. It is clear that her course then lies across the track of the Hurricane, and that, if ignorant of what we now know, she might with a little alteration of time, and tempted by the fine Easterly Gale, run into the middle of it; for till now, though a falling Barometer would teach the seaman that he was to expect a tempest, he was quite ignorant, or had only some general rules derived from very partial experience, to inform him where it was beginning, how it would blow, and how he could escape it. We shall know this as I have said before, when we know the usual path of our Indian Hurricanes.

* In an able review of Col. Reid's work in No. 23 of the *Madras Journal of Literature and Science* by T. G. Taylor, Esq. H. C. Astronomer at Madras, he says, "The East India Gales appear invariably to travel from the coast of Arracan towards the West, the curves conforming gradually to the slope of the shore until in about the latitude of Madras when their course is due South, after which the curve bends again towards the West, the violence of the storm seldom extending below Cuddon or Porto Novo." Mr. Taylor speaks here of a *gale*. He does not observe that he has described the curve which a hurricane (i. e. a turning gale) would make on three sides of its circle.

† Col. Reid, p. 8.

The question of scudding or heaving to must it is evident depend on the commander's judgment as to the position in which he is, his a-room and the like; but the tack on which he ought to heave to is clearly indicated by Col. Reid's directions that I cannot do better than extract them; he says page 425,

"*Rules for laying Ships to in Hurricanes.*—That tack on which a ship should be laid to in a hurricane has hitherto been a problem to be solved; and is one which men have long considered important to have explained.

"In these tempests when a vessel is lying to and the wind veers by the ship's head, she is in danger of getting stern-way* even when no sail is set; for in a hurricane, the wind's force upon the ship's masts and yards alone will produce this effect, should the wind veer ahead, and it is supposed that vessels have often foundered from this cause.

"When the wind veers aft as it is called, or by the stern, this danger is avoided, and the ship then *comes up* to the wind instead of having to break off from it.

"If great storms obey fixed laws, and the explanation given of them in this work be the true one, then the rule for laying a ship to follows like the corollary to a problem already solved. In order to define the two sides of a storm, that side will be called the right hand semicircle which is on the right of the ship's course, as we look in the direction in which it is moving, just as we speak of the right bank of a river. The rule for laying a ship to will be, when in the *right-hand* semicircle to heave to on the starboard tack, and when in the left-hand semicircle on the larboard tack in both hemispheres."

As an example of this on our own diagram. If a line be drawn across those of the 4th and 5th N. 76° E. and S. 76° W. or about WbS. $\frac{1}{2}$ S. and EbN. $\frac{1}{2}$ N., which is the track we have supposed for the hurricane; it will be seen that all the vessels above it, or to the right hand of the hurricane's path, had the wind veering from NE. to South, and were thus safe upon the starboard tack, and all

* From being taken aback. This taking aback in a tempest we all know to be the most dangerous, not only on account of the getting stern-way here mentioned; being pooped, dismasted, and the like; but from another danger which is not sufficiently adverted to I think; and this is, that a vessel, may in one of the terrific gusts which accompany these sudden shifts of wind be thrown on her broadside in the trough of the sea *with her deck towards the sea!* In such a case she is in the position of a vessel on a reef which has fallen over to seaward; and there is every chance that her hatches would be beaten in; which would swamp her. A parallel case to this is mentioned in Col. Reid's work, page 221, of the H. C. S. Diana, when part of the upper fore-hatchway was stove in by the weight of the water above it, and the vessel nearly swamped in consequence. Hatches, particularly those of the upper deck, should not only be made stouter than they usually are (they might for lightness be lined with sheet copper or iron) but moreover two extra strong fore and aft-pieces should be made to ship parallel with the middle piece, halfway between it and the side, so as to afford additional support in cases like this. I shall be told that we know of very few instances of this accident. This may arise from few escaping to tell the tale. The number of well-found, stout ships, ably manned and commanded, which disappear induce us to believe that, apart from fire, there are storm-dangers which we can only guess at. I think this may reasonably be supposed to be one of them. H. P.

those below it,* or on the left hand side, had the wind veering from N. to SW. and were thus safe on the larboard tack. The vicinity of the shore, or the necessity of wearing to ease the masts, if the rigging has stretched too much upon one tack, may oblige the seaman to vary from this rule; and close to the centres of the hurricanes anomalies may be found; but it will be seen at once, I think, without further explanation, of what great value it must ultimately prove to him.

I annex here a public order recently issued by the Government of India, and a memorandum by the Lords of the Admiralty and by Lord Glenelg, which will assist in shewing both the seaman and landsman what we require in the way of information on this subject.

Calcutta: Wednesday, 11th September, 1839.—NOTIFICATION.—The importance of investigating the course and Phænomena of Storms has been brought to the notice of Government by the Hon'ble Court of Directors; and the Hon'ble the President in Council is in consequence desirous of obtaining local Registers of these Phænomena taken simultaneously at as many stations of India as may be found possible. The public Officers of the different settlements and stations of India are accordingly invited and requested, upon the occurrence of any Hurricane, Gale or other Storm of more violence than usual, to note accurately the time of its commencement, the direction from which the wind first blows, whether in gusts or regular, and whether accompanied with rain, thunder and lightning or other Phænomena. Also to note, with as much accuracy as possible, the changes of direction in the wind, and the time of the occurrence of each, and lastly, the duration of the Gale and in what quarter the wind is when it ceases. The variations of the Thermometer and Barometer at each period noticed will also be of importance if the means are forthcoming of making such observations.

The President in Council refrains from making it the business of any particular Officer to note the above circumstances, but relies on the known desire of all enlightened persons to promote objects of scientific and useful enquiry that the public Officers will arrange in such manner as to ensure that the observations will be taken by some one in the vicinity of each station.

Reports upon matters of the description comprehended in this Order may be forwarded to the Secretary to Government in the General Department, free of postage, (superscribed "Storm Report.")

A scientific gentleman in Calcutta has obligingly undertaken to combine all reports that may be so received into a synopsis for exhibition of the results in the manner adopted and recommended by Colonel Reid, R. E.

By Order of the Hon'ble the President of the Council of India in Council.

H. T. PRINSEP,
Secy. to the Govt. of India.

* The places of the Justina and Eden, by an oversight, are unfortunately omitted in the diagram of the 5th. It will be seen that they had the wind at SW. and SWbW. on that day.

MEMORANDUM.

Admiralty, Dec. 28th, 1838.

The Lords Commissioners of the Admiralty having had under consideration the general utility of recording with clearness and precision, the log books of all Her Majesty's ships and vessels of war, the usual state of the winds and weather, have thought fit to order that hereforward in each page of the log book two columns should be introduced, wherein the force of the wind and the appearance of the atmosphere, shall be every hour registered according to the annexed scheme, a copy of which shall be pasted into each book, and painted on the back of every log board or log slate: and two more columns shall likewise be given for the purpose of entering the heights of the barometer or simpiesometer, and thermometer, when such instruments may be on board.

By command of their Lordships,
C. WOOD.

To all Captains, and commanding officers
of Her Majesty's ships and vessels.

FIGURES TO DENOTE THE FORCE OF THE WIND.

denotes Calm.

Light Air, just sufficient to give Steerage way.

Light Breeze, ..	} with which a well-conditioned man-of-war, under all sail, and clean full, would go in smooth water, from	} 1 to 2 knots.	
Gentle Breeze, ..			} 3 to 4 knots.
Moderate Breeze, ..				} 5 to 6 knots.

Fresh Breeze, ..	} in which the same ship could just carry, close hauled, ..	} Royals, &c.		
Strong Breeze,			} Single-reefs and top-gallant sails.	
Moderate Gale,				} Double reefs, jib, &c.
Fresh Gale, . . . .					} Triple reefs, courses, &c.
Strong Gale, ..	} Close reefs & courses.			

Whole Gale, ..	with which she could only bear	} Close reefed main top-sail and reefed fore-sail.
Storm,	with which she would be reduced to	

Storm,	with which she would be reduced to	Stay-sails.
--------------	---	-------------

Hurricane, ..	to which she could shew ..	No canvas.
---------------	----------------------------	------------

LETTERS TO DENOTE THE STATE OF THE WEATHER.

b Blue sky—whether with clear or hazy atmosphere.	p Passing showers.
c Cloudy— <i>i. e.</i> Detached opening clouds.	q Squally.
d Drizzling rain.	r Rain— <i>i. e.</i> Continuous rain.
f Fog—f thick fog.	s Snow.
g Gloomy dark weather.	t Thunder.
h Hail.	u Ugly threatening appearance of the weather.
l Lightning.	v Visibility of distant objects—whether the sky be cloudy or not.
m Misty or hazy—so as to interrupt the view.	w Wet dew.
o Overcast— <i>i. e.</i> The whole sky covered with one impervious cloud.	. Under any letter denotes a extraordinary degree.

By the combination of these letters, all the ordinary phænomena of the weather may be recorded with certainty and brevity.

EXAMPLES.

b c m Blue sky, with detached opening clouds, but hazy round the horizon.

g v Gloomy dark weather, but distant objects remarkably visible.

q p d l t Very hard squalls, and showers of drizzle, accompanied by lightning, with very heavy thunder.

Nautical Magazine,—March, 1839.

Memorandum respecting the Records to be kept of the state of the Weather in the British Colonies.

The Captains of Ports, Harbour-Masters, and Keepers of light houses, or, where those officers do not exist, some other competent public functionary, should be required to keep journals of the weather on the principle of the log books of ships. A column should be specially reserved for inserting the height of the barometer. Under the head of 'Remarks,' should be entered all meteorological observations considered worthy of particular notice. When the keeper of a journal may hear that a vessel has encountered a storm, he will enter in it any information on the subject which he can rely on, together with the name of the ship, of her owner, and of the port to which she may belong. With the view of tracing the course of storms, the Trinity Board of London have given directions for the adoption of measures to obtain a more accurate record of the weather, than has hitherto been kept, at the lighthouses of Great Britain and Ireland. The keepers of these lights having the opportunity of taking their observations by night as well as by day, great advantage may be derived from employing them in this manner. Officers in charge of Colonial lighthouse should be instructed to keep similar journals. In noting the wind force, both in the Harbour-Master's journals and in the lighthouse reports, it is desirable that the officers should adopt the numbers for

oting the strength of the wind now in use at Greenwich Observatory, and about to be introduced at the lighthouses under the Trinity Board. In the cases of St. Helena and Ascension, it is desirable that more precise information should be obtained by observation, respecting the Rollers' at those islands. As the object of H. M.'s. Government in instituting these inquiries is the advancement of knowledge in science generally, the Governors of the several British Colonies will consider how far it may be in their power to obtain useful information bearing on the subject, from countries adjoining to their Governments in the possession of foreign powers, or how far it may be useful to the study of meteorology, to exchange the observations made within their Governments, for those of other countries in the neighbourhood. If at any time desired, there would be no objection to the publication in the Colonial newspapers of extracts from the journals.

(Signed) GLENELG.

There is little to be added to these ample directions, but I may be allowed here to repeat what has been said in another place,*—that every European in India, may be said to have a direct personal interest in this matter; for, though unconnected with commercial speculations, he probably looks one day to cross the ocean himself on his return home; or has those who are dear to him doing so; or he may be sent to sea for his health. It is superfluous to allude here to that general interest which the feelings of humanity must awaken in every man's mind when he hears of a new branch of knowledge, which may so much contribute to disarm the tempest of its terrors; and which careful, common-sense accounts of storms may so very essentially assist us in perfecting.

In closing this first memoir, which, in the absence of abler labourers in the field, I propose to follow by others as I can find materials, I ought to apologize for its imperfections. I have mentioned in Part I. some of the difficulties I experienced in collecting information, and that, on the advice of a friend, I published earlier than I originally intended, to attract attention to the October Gales. When I add to this, that I am far from being master of my own time, I trust due allowance will be made for its defects, by those who are not aware of these circumstances. To solicit information on any question of natural history is often fruitless enough in all countries, but upon meteorological questions, and in India, where the public mind has not yet been drawn to attention on this head, and where observers are so few, is absolutely at times, to use a Gallicism, *désespérant*. I trust however this little essay will shew how much every trifle, insignificant as it

* Englishman, 17th September, 1839.

might be thought by the possessor, may contribute to the end we see. Mr. Hudson's valuable barometrical observations on board the *Hc Floating Light*, I have alluded to at p. 589; and I may state here, that those of the Hurricane of October, 1832, quoted by Col. Reid p. 269, taken at Chandernagore, are my own; and both prove to be of far more utility than was at the time supposed by the observers. We may indeed, if allowed to speak metaphorically on such a subject, say, that as the great pyramids of human knowledge must be built of separate stones, no man can say, before he brings his to the builder, that may not become "the head stone of the corner!"

ART. III.—*Extracts from Mr. M' Clelland's paper on Indian Cyprinidæ. As. Res. Vol. xix. Part II.*

For such of our readers as do not subscribe to the *Researches of the Society*, we take this opportunity of extracting such parts of the 2d part of the 19th vol. just published, as may be separated, without disadvantage from the rest of Mr. M' Clelland's paper. The utility of Ichthyology is set forth in the following remarks.

"Utility will always be found to depend more on the degree of attention paid to any subject connected with science, than on the nature of the subject itself; yet it is a common remark that this, or that, is important or frivolous, according as we happen to be acquainted with it. When we find any branch of science regarded as useless, we may be assured that, contrary to ordinary expectation, it will prove the most productive field we can enter. Science, indeed, can only be useful where it has been cultivated, and its principles worked out; practical results will then follow in proportion to the pains taken to develop them.

"The moral interest of Ichthyology having been sufficiently attended to throughout the preceding paper, I shall here pass it over, merely remarking, that in common with other branches of natural science it is calculated to improve the mind as well as the condition of society while its cultivation need not interfere with any duty, public or private; and few who are placed on our coasts, or on the banks of any of the noble rivers of India, who might not with amusement to themselves, and advantage to science, communicate many observations on

ere else to be collected regarding our indigenous species. The season of spawning, and places to which the various species resort for this purpose—their food—the kind of waters in which they thrive best—whether running or stagnant—with sandy or with muddy bottoms,—should all be points of great interest that might be settled by persons of pretensions to a scientific knowledge of the subject.

“With regard to the propagation of fishes, Mr. Yarrell remarks—that an acre of water will let in many parts of the continent, where fresh water fishes are in more request than in England, for more than an acre of land. In no part of the continent of Europe, however, can fresh-water fish be of so much importance as in India, where most of the domestic animals which in Europe afford the principal food, as the ox, swine, poultry, &c. are rejected by a large proportion of the people.

“Throughout the Mysore country, as well as in many of the western provinces, large tanks or reservoirs occur, many of them from three to thirty miles in circumference, and being indispensable for irrigation, may be supposed to be nearly universal in all populous districts not watered by rivers. These reservoirs are considered by the Hon’ble Colonel Morison C. B.* as among the greatest national monuments to be found in India.

“They are capable, according to Buchanan,† of supplying water for from eighteen months to two years, and thus of maintaining the surrounding crops should no rain fall within that period.

“They are drained by an ingenious system of sluices and aqueducts of the most simple, but complete construction, which afford a perfect control over the distribution of the water. During the dry season they are all pretty much exhausted, and may, if necessary for repairs, be left perfectly dry. This would afford an excellent opportunity for destroying crocodiles and all the various destructive fishes, sparing only the more profitable kinds, which are limited to two or three species only; and by repeating this operation for several seasons, or as often as may be necessary, all but those we wish to propagate would soon be exterminated.

“By a wise law of nature, the carnivorous animals of every class are less prolific than the harmless, and may therefore be the more easily subdued. Nearly all the destructive fishes are viviparous, bringing

* To whom I am indebted for many particulars regarding them.

† See his Journey in Mysore.

forth comparatively few young ; whereas, the more profitable kind those which should be the object of our care, are all oviparous, bring forth their young from spawn.

“ A single female Carp weighing only nine pounds has been found Bloch to contain no less than six hundred thousand ova ; and Schneider, one, ten pounds weight, was found to contain seven hundred thousand ova, or eggs.

“ The fecundity of the *Ruee*, *Catla*, and *Mrigala*, has not yet been ascertained, but from their close affinity to the Carp we may suppose them to correspond in this respect with that species ; the question however, is one that may be easily ascertained by weighing a grain of the roe and ascertaining the number of globules it contains, where these will be to the whole roe what one grain is to its entire weight. The result will show that these species are capable of yielding, by their extraordinary fertility, a source of food as inexhaustible as the sands of the ocean, could we only bring their propagation and the safety of the young sufficiently within our control.

“ In the reservoirs above described, we have every facility for effecting this object on a scale of great magnitude, without in any way interfering with the other uses of the water.

“ There are certain kinds which though they cannot be said to be carnivorous, would yet be still more fatal to our object by devouring the spawn or ova, such are the Barbels, common in the higher parts of our rivers, and which but for a knowledge of this trait in their character would, from their appearance and flavour, be the first we should recommend for propagation, and thus from an ignorance of one simple fact, destroy every chance of success. We should not however, condemn all the Barbels merely from a fault in some of the species, the circumstance should impress on our minds the necessity of confining the varieties of fish in a single reservoir to the lowest possible number of herbivorous kinds, such as the three I have mentioned, namely, *Cyprinus rohita*, Buch. *Cyprinus catla*, id. and *Cyprinus mrigala*, id. ; there is reason to believe that either of these species would answer equally well in any part of the plains of India. As they usually attain a large size, they may be slow in coming to perfection, and, therefore, instead of having these three large species in the same water, it would probably answer the purpose better to have one of them only as a principal species, with any one of the common Gudgeons or Bangons of India as a cheaper article, which would

it require more than a year or two at the utmost to arrive at perfection. Beyond a single species of *Gobio*, and a single one of the larger species already mentioned, more ought not to be introduced into the same water, or allowed to exist in it, from the danger of their becoming inimical to each other, a point which I presume has never been attended to sufficiently in attempts hitherto made to propagate fishes; hence, perhaps, the want of that degree of success which no doubt would have rendered a practice so simple and beneficial, long since universal.

"The only alteration in the present form of the reservoirs, to adapt them to the purposes in view, would be to enclose the lowest portions of the bottom of each with stakes long enough to reach above the highest surface of the water, and close enough together to prevent the entrance of crocodiles, otters, and the like, should any such exist in the neighborhood. The spawning season of the *Ruee* and other cyprinids, appears to be in the dry weather; the contrivance here suggested would therefore protect them at that time, and if there should be any danger of the whole of the water drying up, wells of sufficient size and depth might be formed within the enclosure, to which the fishes would retire during droughts, while the shallow waters around the wells would afford space enough for the deposit of spawn.

"Much of our success would depend on keeping these enclosures as free as possible from all but the species we desire to propagate. At the commencement of the dry season, before the fish begin to enter the enclosure, the interval between the stakes might be closed with a draw, and as the water becomes sufficiently low without, most of the rapacious kinds may be removed or destroyed; none should be allowed to remain, but that species alone which may be the object of our care. This done, the only further attention necessary, would be to save the fish in the enclosure from birds during the remainder of the dry season.

"Should our success be complete, from every moderately sized female *Ruee* we should have on the commencement of the rains from five to ten hundred thousand fry, which, as the waters rise would be quite able to take care of themselves till the next season, when it would be necessary again to destroy the rapacious kinds, as before.

"The repair of the *carays** of Mysore, is said by Buchanan, to be

* Such is the name by which the reservoirs are known in Southern India when kept open for irrigation.

attended with considerable expense, nevertheless it is understood to be an indispensable object to have them in perfect repair, since the fertility of the country depends entirely on them. The plan here proposed of converting them to new purposes of utility would add to their importance, and the interest of keeping them up, without in any way increasing their expense.

"On the fishes of Bengal, Assam, and other provinces subject to the inundations of the larger rivers, we can exercise no control, nor is it desirable that we should, even if it were in our power, the supply of fish being plentiful and constant enough: but in the higher parts of the plains, near the foot of the mountains where the larger Cirrhin and Barbels retire during the dry season for the purpose of spawning fisheries might be carried on with advantage to a considerable extent.

"It would here be out of place to enter on the subject of sea fisheries and before we could do so with advantage it would be necessary to pay as much attention, or more, to the fishes of our coasts as we have devoted to those of our rivers.

"Already we have attained one important piece of information regarding the value of the *Sulca* fish of our estuaries, *Polynemus seles*, Buch. which from the earliest times has been celebrated throughout China for its isinglass. This substance was formerly supposed to be afforded only by certain fishes in the rivers of Muscovy, from whence it was exported to all parts of Europe, where, from its high price, its use is chiefly confined to the arts.

"A solution of this substance mixed with Canadian balsam and spread on black silk forms the useful article called court plaster. A few grains of isinglass boiled in milk forms a most nutritious food which is given medicinally.

"Ignorant of its abundance in certain fishes of the Hoogly, that used by the English residents in India is still imported, probably at an expense of about 800 Rs. per maund,* while the same thing is collected in abundance and shipped to China from the Calcutta river.†

"Ten grains of this substance is sufficient to give the consistency of jelly to a pint of water, and as it keeps good in a dry state for any length of time, we may imagine its value as a portable food, and what its importance might be in times of scarcity, since one pound avoird-

* It is retailed in Calcutta at a much higher rate.

† See Journal of the Asiatic Society for March, 1839.

pois, at the above rate, would afford a nutritious meal to 1560 persons.

Whether it be used in times of scarcity in China I do not know, but probably it is collected and stored to meet such occasions, since Lumqua—an honorary member of this Society—a Chinese Physician, long resident in this city informs me that the Bengal *fish-sago* procured from *Polynemus seles*, Buch. is known throughout the empire, and that nothing could surpass his surprise on his arrival nearly twenty years ago in Calcutta, when he found that with the exception of his own countrymen who carried on the trade, no one appeared to know or care anything whatever for the article in question, and as no one could describe the fish, the same ignorance continued up to within the last few months to prevail on the subject. The advantage, however conceivable, of an abundant supply of any substance, a single maund of which would afford a nutritious meal to upwards of one hundred thousand persons, could only be felt occasionally, but the intrinsic value of the article in all the common conveniencies of life, is eminently calculated to direct attention to other uses of the species affording it.

“This is one of the largest and finest fishes, both as regards flavour and wholesomeness, on our coasts or in our rivers, while the season at which it is taken is the one most favourable for a residence in boats or sampans in the Sunderbuns. Under these circumstances it is not likely that the subject of sea fisheries in this quarter will be altogether overlooked, longer than the circumstances on which their success must depend shall have been properly examined.

“All sea fisheries are practised on migratory species, which advance usually at stated periods in search of food and proper situations to deposit their spawn. Their progress is so regulated that at certain seasons they approach the different coasts, in their course, with so much regularity as to enable the people to repose as much confidence and repose in their coming and departure as they usually place in the ripening of their crops. The shoals of fishes are so dense as to cover the sea leagues without interruption, and extend to a solid depth of many fathoms in some instances, so that they are taken as quickly as it is possible to salt and barrel them. The season lasts from a month to six weeks, when thousands of ships are laden with cargoes which are to serve as the common stock of food for many of the surrounding nations twelve months, when the fishing is recommenced.

“Such are the fisheries on the banks of Newfoundland, on the coasts of Norway, Sweden, and Great Britain; and unless the coasts of India

afford promise of resources of similar extent and importance, the object would hardly require much public attention. If, however, it be found that we have species on our coasts equal in every respect to that which is the object of enterprise at Newfoundland, and that these advances to the Sunderbuns at a season when ships and men without number may be employed with safety, there can be nothing to prevent the national importance of the circumstance.

"In this instance, as well as in that of the propagation of fresh-water species, science, while it exhibits varieties as numerous almost as stars, teaches us at the same time how to strip the subject of vague ideas arising from this cause, and amidst the countless species which inhabit our seas, directs our attention and our energies to a few only, and these the *Sulea*, or *Polynemus sele*, Buch. is the one which from its bulk, its habits, and its qualities in every way seems capable of becoming a permanent benefit to society. It appears to be the Cod-fish of the tropics, and equals its representative in the northern seas in those qualities which render that species so invaluable; but from its bulk it is unmanageable by the Indian fishermen, who are also without the means of preserving it.* These however are not sufficient reasons why an article that might add an exhaustless supply to the common stock of food should be altogether lost, now that an European settlement under the influence of a paternal government, begins to infuse itself into all things connected with the resources of India. *As. Res. vol. 19. p. 457—464.*

* It must have been long known that the difficulty of preserving meat depends on the state of the atmosphere in regard to electricity and moisture than on temperature. In Calcutta, in the month of December, when the mean temperature is 60°, it is not uncommon to keep meat before it is dressed for eight days, though in England during the summer at the time of herring fishing too, it cannot be kept in the best meat-safes for more than half that time, though the temperature be lower here. With salt and other means at hand, I conceive there would be no difficulty in curing fish in an Indian climate in the months of November and December, when *Sulea* fishing would be carried on; nevertheless the subject is one of much interest and I cannot therefore omit the following remark with which I have been favoured by Mr. C. K. Robison, one of the Magistrates of Calcutta. "It would be a famous thing if these enormous fish (the *Sulea*) could be cured, as well as their oil in glass obtained; and I cannot help thinking the measure very feasible, if the fish were cured at the time of taking them and cutting them up, dipped them first into weak chloride of soda mixed with a small quantity of impure pyroligneous acid. This would not only preserve the fish till the salt acted, but improve the flavour." These materials could be manufactured at a very cheap rate on the spot, as well as every thing else that might be requisite. For an account of the *Sulea* fish, see *Journal Asiatic Society Bengal* March 1839, p. 203. Also an article on "some Indian Fishes by Dr. Cantor," *Proceedings Royal Asiatic Society*, April 1838. *As. Res. vol. 19. p. 461.*

"*Cyprinidæ*, of all fishes of equal importance are those that appear to have occupied least, the attention of naturalists; a circumstance the more curious, as in consequence of their being peculiar to fresh waters, they are more universally distributed in the interior of continents, where they ought to be more familiar and useful to man than any other family of the same class.

"Regarding their distribution, little has hitherto been made known. It would not appear that there is any one species common to Europe and America; it is not however to be supposed that we are yet prepared to form an accurate comparison between the *Cyprinidæ* of the old and new worlds, since the majority of species in either seems as yet to be but ill defined. Nor is it to be supposed that ichthyology has yet been prosecuted in America to an extent at all likely to make us acquainted with the numerous species that must inhabit the extensive lakes and rivers of that continent. Of African species few only are referred to by Cuvier, while the Nile is known to present some species that are not found in the south of Europe. The Chinese species may not be said to be almost unknown, with the exception of a few determined by Cuvier from the very doubtful data afforded by paintings; though it is seldom that so favourable an opportunity is afforded for collecting information on any branch of natural history, as that which the British embassies in China possessed, for investigating the peculiarities of the fresh-water fishes of that empire, from the length of time they passed in boats on some of the principal rivers. Nor is any thing whatever known, as far as I am aware, of the existence of Cyprins in New Holland or any of the Polynesian Islands. In India the fishes of several of the great rivers yet remain to be investigated, as those of the Irrawaddi, the Indus, and the Nerbudda. A collection of drawings of the fishes of the Indus, prepared during a scientific mission under Capt. Burnes, has recently been deposited in the museum of the Asiatic Society; and Mr. Griffith, to whom every branch of science is as dear as the one in which he is fast rising to the highest station, is now engaged in making extensive collections of, and observations on, the fishes of the same river. The museums of Paris must already be well stored with Indian species collected by Messrs. Duvaucel, Jaquemont, and De-Lessert, but I doubt if any of our British museums contain any of the commonest species of the Ganges.

"Natural history is now assuming a station so important in the highest scale of intellectual pursuits, that any remarks at all calculated to impress on the minds of those who are connected with missions into

new countries a lively sense of the interest that attaches to its more minute details, will not, we may be assured, be taken amiss. Information however carefully collected on such occasions as those referred to becomes comparatively useless when unaccompanied with specimens of the things to which it relates. We should ever recollect that the easiest and best way to promote our own fame, and contribute at the same time to the advancement of natural history, is by making collections, nor are we without examples of the highest awards having been, though somewhat prematurely, conceded to collectors. Nevertheless, to render collections of the highest degree of real value in the present advanced state of science, those who make them should gather at the same time as much information as possible regarding the circumstances under which the various objects comprised in them live, and occur; and it is in this that the intelligence of the naturalist may be best and most profitably displayed during his journeys in new countries.

“The following tabular view of the distribution of *Cyprinidæ*, though avowedly imperfect, will serve to show how the leading groups are generally dispersed. Cirrhins, for instance, appear to be peculiar to India, or at least to the tropical parts of Asia, and the Catostomids to America; while both are represented in Europe by the true Carps. From the number of Gangetic species, the Barbels like the Cirrhins would seem to have their metropolis in India, from whence the genus is extended over the Caspian Sea, and the Nile into Europe.

“The Gonorhynchids would also seem, as a group, to be natives of the East, one species only having been found in South Africa, none in Europe, and eleven in India.

“The greater part of the *Sarcoborinæ* are probably also Eastern fishes, with the exception of the Breams and Lenciscs, although some of the European forms set down under the latter genera may be found to belong either to the Perilamps or Opsarions.

“The small sub-genera of *Pæcilia* appear to be equally distributed in all parts of the world, one having been already found in Africa, two species in India, where a few more may be expected, seven species in America, and seven in Europe; but in every case the species of one continent have been found to be distinct from those of another.

“The Loaches (*Cobitis prop.* Lin.) afford another instance of the concentration of numerous species in India, while three only are found in Europe, and none whatever in America. The annexed table exhibits the general distribution of the family.

GENERAL VIEW OF THE DISTRIBUTION OF CYPRINIDÆ

				ASIA.								
FAMILY.	SUB-FAM.	GENUS.	SUB-GEN.	EUROPE,	AMERICA,	INDIA,	CHINA,	CASPIAN,	AFRICA,	UNCERTAIN,	TOTAL.	
CYPRINIDÆ Cuv.	PÆONOMINÆ McClell.	Cirrhinus Cuv.	.. .. .	—	—	13	—	—	—	—	13
		Labeo Cuv.	.. .. .	—	2	1	—	—	1	1	5
		Catastomus Leseur,	.. .. .	—	19	—	—	—	—	—	19
		Barbus Cuv.	.. .. .	—	4	11	—	2	1	—	18
		Oreinus McClell.	.. .. .	—	—	4	—	—	—	—	4
		Cyprinus prop. Cuv.	.. .. .	6	—	4?	4?	—	—	—	14?
		Gobio Cuv.	.. .. .	2	—	16	—	—	—	—	18
		Tinca Cuv.	.. .. .	1	—	—	—	—	—	—	1
		Gonorrhynchus Gron.	.. .. .	—	—	10	—	—	1	—	11
		CYPRINIDÆ Cuv.	SARCOBORINÆ McClell.	Systomus McClell.	—	—	12	—	—	—	—
Abramis Cuv.	.. .. .			5	1	1	—	—	—	—	7
Rhodeus Agass.	} Fossil Genera in the lacustrine deposit of Oeningen.											
Perilampus McClell.	.. .. .			—	—	12	—	—	—	—	12
Leuciscus Klein.	.. .. .			13?	4?	9	—	—	—	—	26
Opsarius McClell.	.. .. .			—	—	12	—	—	—	—	12
Pæcilia	Pæcilia prop. Schn.			—	4	—	—	—	—	—	4
	Lebias Cuv.			—	1	3	—	—	—	—	4
	Fundulus Lacép.			5?	2	—	—	—	—	—	7
	Molinesia Leseur,			—	1	—	—	—	—	—	1
	Cyprinodon Lacép.	.. .. .	2	4	—	—	—	—	—	6	
CYPRINIDÆ Cuv.	APALOPTERINÆ McClell.	Aplocheilus McClell.	.. .. .	—	3	—	—	—	—	3	
		Anebleps Bl.	.. .. .	—	—	—	—	—	1	—	1
		Platycara McClell.	.. .. .	—	—	3	—	—	—	—	3
		Psilorhynchus McClell.	.. .. .	—	—	2	—	—	—	—	2
		Cobitis	{ Cobitis propria McCl.	2	—	12	—	—	—	—	15	
Lin.	{ Schistura McClell.	—	—	11	—	—	—	—	11			
				42	37	139	4	2	4	1	229	

"The American species of this family referred to in the Regné Animal, only amount to thirty-three, but Dr. Richardson in his report on North American Zoology mentions nearly as many more, imperfectly indicated by Rafinesque Smaltz, and other writers as belonging to the rivers and lakes of the new world;* still however the preponderance of species in favour of India is so remarkable, that it is only by extending our consideration to other genera of the order *Malacopterygii abdominales* that we find the equilibrium restored in the distribution of fresh-water fishes. Thus the *Salmonidæ* which form a large proportion of that order in the rivers of both Europe and America, are in India quite unknown, not one species of that extensive family having

"* I have not yet seen the volume of *Fauna Boreali Americana* by Dr. Richardson, which is devoted to Ichthyology, the volume on Birds being the only part of that important work which has reached India.

yet been found in this country, where the blank appears to be filled up by the excessive development of the *Cyprinidæ*.

“One species of Tench,* four *Leuciscus*,† and one Gudgeon,‡ are enumerated among the fossils of Oeningen by M. Agassiz, who also describes two new genera || *Rhodeus* and *Apius*, nearly allied to, but distinct from the *Perilampus* and *Systemus*. They are distinct from the first, by the dorsal and ventral margins being equally arched, and the caudal and anal fins being less developed; and from the second, by the absence of spines in either of the latter fins; both belong however to *Sarcoborinæ*, and will serve to render that group far more complete than it appeared to me to be before I saw M. Agassiz’s splendid work. Two fossil species of *Cobitinæ* are also found in the same locality, one of these, *C. cephalotus* Agass. belongs to *Schistura*. The marlstone in which these remains are found is justly considered by M. Agassiz to be a lacustrine deposit, and supposed to be coeval with the molasse of Switzerland and the sand stone of Fontainebleau, and consequently to correspond with the miocene or early tertiary period.” *Op. cit.* p. 257—262.

As a specimen of the manner in which the subject is treated we shall here give from the synopsis of his paper one of the three sub-families into which Mr. M^c Clelland has separated the Cyprins; on a future occasion we may quote the two remaining sub-families, from the same part of the work. p. 264—283.

“1. SUB-FAM.—PÆONOMINÆ. § J. M.

“CHAR. Mouth slightly cleft, either horizontal or directed more or less downward. The stomach is a lengthened tube continuous with a long intestinal canal. Colours plain. Three rays in the branchial membrane.

“OBS. They occur only in fresh-water, and comprise a large proportion of the fishes of lakes and rivers, more especially those that are of economical importance. Their food consists chiefly of confervoid plants and other productions of the vegetable kingdom.

* *Tinca leptosoma*, Agass. *Recherches sur les Poissons Fossiles*, vol. v. t. 51.

† *Leuciscus papyraceus*, Agass. V. t. 36. *P. leptus*, Agass. V. t. 57. *L. pusillus*, id. l. c. *L. oeningensis*, id. and *L. heterurus*, id. l. c.

‡ *Gobio analis*, Agass. t. 57.

|| *Rhodeus elongatus*, Agass. t. 54. and *R. latior*, id. l. c. Of the genus *Apius*, M. Agassiz describes *A. gracilis*, and *A. brongiarti*, V. t. 55.; but the latter as well as *Leuciscus papyraceus* are from the lignites of Mènat.

§ From *Poionomos*, that feeds on herbs.

"I. GEN.—CIRRHINUS.

"CHAR. Lower jaw composed of two short limbs loosely attached together in front, where instead of a prominent apex, there is a depression; lips soft and fleshy with four cirri,* dorsal without spinous rays.

"OBS. This genus would seem to be represented in America by the *atostomi* of Leseur, and in Europe by *Cyprinus proprius*, Cuv. In India it affords several of the most favourite, abundant, and wholesome species.

Spec. C. macronotus, J. M. t. 41. f. 1.

Length of the head to that of the body as one to four; forty-one scales along the lateral line, and thirteen in an oblique line from the base of the ventrals to the dorsum. D.23 : P.16 : V.9 : A.7 : C. 19.

HAB. Assam and North-eastern parts of Bengal, where it attains from two to three feet in length.

Spec. C. nandina, Buch. P. G. † t. 8. f. 84.

Length of the head to that of the body as one to three; forty-four scales along the lateral line, and twelve in an oblique line from the base of the ventrals to the dorsum. D.26 : P.16 : V.9 : A.7 : C.19.

HAB. Bengal and Assam.

Spec. C. calbasu, Buch. P. G. t. 2. f. 33.

Length of the head to that of the body as one to four and a half; forty-two scales along the lateral line, and fourteen in an oblique line from the base of the ventrals to the dorsum. D.15 : P.17 : V.9, or 10 : A.8 : C. $\frac{10}{9}$.

Variet. Forty-two scales along the lateral line, and fifteen in an oblique line from the base of the ventrals to the dorsum. D.16 : P.15 : V.9 : A. 5 : C. $\frac{9}{10}$.

HAB. Bengal and Assam.

Spec. C. rohita, Buch. P. G. t. 36 f. 85.

Length of the head to that of the body somewhat less than one to three; forty-two scales along the lateral line, and twelve in an oblique line from the base of the ventrals to the dorsum. D.15 : P.16 : V.9 : A.7 : C. $\frac{10}{9}$.

Variet. ‡ t. 41. f. 2. Forty-three scales along the lateral line, and thirteen in an oblique row from the base of the ventrals to the dorsum. D.15 : P.16 : V.9 : A.8 : C.20.

HAB. Bengal and Assam.

* I am not sure as to cirri forming any very valuable character of a natural genus. The length of the dorsal fin certainly does not; in the first species it is as long as in the Carp.

† P. G. These initials refer to Buchanan's work on Gangetic Fishes.

‡ This fish attains a large size in Assam, and is probably the true *Ruee* of the natives. That which is figured by Buchanan is as far as I have seen a small fish, though the larger kind which I have figured would seem to be the one he has described. This as well as the preceding species present so many varieties, probably the result of artificial means resorted to for their propagation, from their value as an article of food, that it is difficult to define their true characters.

Spec. C. gonius, Buch. P. G. t. 4. f. 82.

Scales minute; snout muscular and perforated by numerous mucous pores. D.15 : P.17 : V.9 : A.7 : C.19.

HAB. Bengal and Assam.

Spec. C. nancar, Buch. P. G. p. 299.

Sub-operculum rudimentary, and concealed beneath the integument. D.20 : P.18 : V.9 : A.8 : C.19.

HAB. North-eastern parts of Bengal.

"The following three species have a black spot at the base of the caudal, and the dark colour of the back descends in fasciated points on the sides, thus indicating a relation with the *Sarcoborinæ*; but until the nature of this relation be determined, and their habits and structure known, I place them with the Cirrhins. I only know them by Buchanan's figures and descriptions.*

Spec. Cyp. morula, Buch. P. G. Pl. xviii, f. 91.

Length of the head equal to the altitude of the body, and to a fourth of the length; lips pendulous, the hinder fimbriated. D.13 : P.16 : V.9 : A.8 : C.19.

HAB. Ponds in Bengal.

Spec. Cyp. joalius, Buch. t. 42, f. 6. β †

Head large and very blunt, mouth low and horizontal. D.12 : P.— : V.9 : A.8 : C.—?

HAB. North-eastern parts of Bengal.

Spec. Cyp. dero, Buch. P. G. t. xxii. f. 78.

Only two cirri. Head oval and blunt, snout prominent and rough, lips smooth-edged. D.13 : P.18 :—? V.9 : A.7 : C.19.

HAB. Bramaputra.

" SUB-GEN.—LABEO.

"CHAR. Structure and habits agree with those of the Cirrhins, but cirri are wanting, or very minute.

"OBS. The last species would seem to be a *Catastomus*, and the two first to be very nearly allied to each other, and to differ chiefly from *C. gonius*, Buch. in being without cirri. They correspond with the species named by Buchanan, *Cyp. curchius*, *C. cursa*, and *C. cursis*, but I cannot altogether reconcile them with his descriptions; they appear to me to be varieties resulting from domestication.

* To these may be added for the present *Cyp. pausio*, Buch. P. G. 317. t. 42 f. 4 β . It seems to differ from them merely in being without cirri.

† This sign β , denotes that the figure given is from Buchanan's collection.

pec. Cyp. curchius, Buch. t. 40. f. 3.

Scales minute and disposed so as to indicate longitudinal stripes, lips fleshy and fimbriated, seventy-eight scales along the lateral line, and thirty from the base of the ventrals to the dorsum. D.17: P.16: V.9: A.7: C. $\frac{10}{9}$.

HAB. Bengal and Assam.

pec. Cyp. cursis,* Buch. t. 38. f. 3.

Snout thick and projecting, eighty-three scales on the lateral line, and about twenty-seven across the body from the base of the ventrals to the dorsum. D.16: P.17: V.9: A.7: C. $\frac{10}{9}$.

HAB. Assam and Bengal.

Variet. Cyp. cursa, Buch. t. 38. f. 2. β

Scales and fin rays the same as in *C. curchius*, but the back is more abruptly arched, and the abdominal margin is straight to the anal.

Spec. C. dyocheilus,† J. M. t. 37. f. 1.

Goreah of the Assamese.

Head long, opercular plates covered with thick integuments, snout muscular, forty-four scales along the lateral line, and thirteen in an oblique line from the base of the ventrals to the dorsum. D.12: P.18: V.9: A.8: C.19.

HAB. Assam, where it usually attains two feet and upwards in length.

“II. GEN.—BARBUS.

CHAR. Lower jaw composed of two lengthened limbs, united in front so as to form a smooth narrow apex. Dorsal short preceded by a strong spine, lips hard, four cirri, intermaxillaries protractile.

“OBS. Species of this genus inhabit the Caspian Sea, the Nile, and several of the rivers of Europe, generally confined to clear water. The comparative shortness of the intestinal canal proves them to be less exclusively herbivorous than any other fishes of the same sub-family. The Indian species, indicated in the Regné Animal, all belong to other genera.

Spec. B. hexastichus,‡ J. M. t. 39. f. 2.

Cyp. tor, Buch. P. G. 305.

Lobura of the Assamese.

Length of the head to that of the body as two to seven, twenty-five scales along the lateral line, and six in an oblique row from the base of the ventrals to the dorsum. D.11: P.17: V.9: A.8: C.19.

HAB. Great rivers in the plains of India. Ordinary length from one and a half to three feet.

* This variety had been figured from a dried specimen and transferred to stone, before I found in Buchanan's collection a most excellent drawing of it.

† So called from the pendulous structure of the snout descending so as to form the appearance of a second lip.

‡ From the scales forming six rows along the sides.

Spec. B. progeneius,* J. M. t. 56. f. 3.

Cyp. tor, Buch. Coll.

Length of the head to that of the body as one to three, twenty-six scales along the lateral line, and six in an oblique row from the base of the ventrals to the dorsum, with a large cellular appendage to the apex of the lower jaw. D.12 : P.16 : V.9 : A.7 : C.19.

HAB. Great rivers in the plains of India. Ordinary length from 1½ to 2 feet.

Spec. B. macrocephalus, J. M. t. 55. f. 2.

Bura hetea of the Assamese.

Length of the head to that of the body as two to five, twenty-seven scales along the lateral line, and six in an oblique line from the base of the ventrals to the dorsum. D.11 : P.16 : V.10 : A.7 : C.19.

HAB. Rapids in Upper Assam. Ordinary length from 2 to 3½ feet.

Spec. B. hexagonolepis,† t. 41. f. 3.

Bokar of the Assamese.

Length of the head to that of the body as one to four, exposed surface of the scales hexagonal, twenty-seven scales along the lateral line, and seven in an oblique line from the base of the ventrals to the dorsum. D.12 : P.16 : V.9 : A.7 : C. $\frac{10}{9}$.

HAB. Upper Assam. Ordinary length from 1½ to 2½ feet.

Variet. Cyp. putitora, Buch.

Head small and blunt, with eleven rays in the dorsal, attaining occasionally nine feet in length.‡

Spec. B. megalepis,§ Hardw. Illust. t. 93.

Cyp. mosal, Buch.

Mahaseer of the Hindus.

Body below uniformly arched at the insertion of the anal, length of head to that of the body as one to three. D.13 : P.17 : V.9 : A.7 : C. $\frac{10}{9}$.

HAB. Northern parts of Bengal. Length occasionally four or five feet.

Spec. B. chelynoideus, J. M. t. 57. f. 5. Jour. A. S. vii. t. 56. f. 5.

Head large, lips thick and smooth, thirty-three scales along the lateral line, and nine in an oblique line from the base of the ventrals to the dorsum. D.10 : P.16 : V.9 : A.7 : C.18.

HAB. Mountain streams at Simla. Usual size about six inches in length. Dr. Macleod's Coll.

* From *Προγενειος*, that has a prominent chin or long beard; in allusion to the singular appendage to the lower jaw of this species by which it may be easily recognized.

† In allusion to the form of the exposed portion of the scales.

‡ This fish I have been unable to identify with Buchanan's description, I therefore have described it under another name; he says the head is blunt, oval, smooth and smooth, which scarcely applies to either of the foregoing, in which the head is markedly lengthened; that of *B. hexagonolepis* would come nearest to it, though so of the others seem to correspond more in other respects with the account given. Phil. Zool. 303.

§ From *Mega* large, and *lepis* a scale.

Obs. The following five species have the dorsal spine serrated behind. The first three are probably varieties of the same species.

pec. *Cyp. sarana*, Buch. P. G. p. 307.

Cyp. kanta, id Coll.

Cyp. kunamo Russ?

Head blunt, oval, and small, with a small bone at either side of the upper lip, green above, below silvery, scales large. D.10 : P.16 : V.9 : A.8 : C.19.

HAB. Ponds and rivers in India. Rarely attaining two feet in length.

pec. *B. spilopholus*,* J. M. t. 39. f. 4.

Head much compressed, cheeks and snout perforated with mucous pores, forty-eight scales along the lateral line, and seventeen in an oblique row from the base of the ventrals to the dorsum; each scale marked with a black spot at the base. D.11 : P.15 : V.9 : A.7 : C. $\frac{10}{9}$.

HAB. Northern parts of Bengal.

Variet. *Cyp. chagunio*, Buch. P. G.

Scales large and spotted at the base, head much compressed, with numerous prominent mucous pores on its fore part. D.12 : P.15 : V.10 : A.8 : C.19.

HAB. Northern parts of Bengal.

pec. *B. deliciosus*, J. M. t. 39. f. 3.

Head short and blunt, thirty-four scales along the lateral line, eleven in an oblique line from the base of the ventrals to the dorsum, with a bright gold coloured spot on each operculum. D.12 : P.16 : V.9 : A.7 : C.19.

HAB. Assam. Ordinary size about 10 inches in length.

Spec. *B. rododactylus*,† J. M.

Fins red and orange, except the dorsal and upper lobe of the caudal, ten rays in the dorsal.

HAB. Lower Assam. Usual size about 5 inches in length.

“SUB-GEN.—OREINUS,† J. M.—MOUNTAIN BARBELS.

CHAR. Head fleshy, mouth vertical, lower jaw shorter than the upper, snout muscular and projecting, furnished with cirri, dorsal pre-
ceded by a serrated spinous ray, scales small.

Obs. Intestinal canal and stomach form a tube equal to about four
fifths lengths of the body, including the head and caudal.

From *spilos* a spot, and *pholis* a scale.

Rododactylos, literally rosy-fingered, in allusion to its red fins.

From *Oreinos*, pertaining to mountains. This genus has been since published by Von Heckel a German naturalist, from the collections taken home to Europe by von Hugel on which Mr. McClelland observes page 455 “that it would really seem if we intended to leave all that requires either intellect or observation to discover in productions of India to our neighbours on the continent, &c. &c. To be fairly rivalled in pursuits where facilities are equal between the parties would be bad enough, but we are indebted to strangers for a knowledge of the productions of our own country and a fault somewhere, but where that fault lies it might be a delicate question to enquire, as none of us I fear, would be altogether free from a share of the reproach.”

Spec. O. guttatus, J. M. t. 39. f. 1.

Head covered with thick integuments, branchial apertures small, sides and fins irregularly marked with brown spots, scales minute. D.10: P.1: V.11: A.10: C.20.

HAB. Mountain streams in Boutan, at an elevation of about 5000 feet where it was found by Mr. Griffith.

Spec. Cyprinus Richardsonii, Gray. Hardw. Illust. t. 94. f. 2.

About eleven rays in the dorsal, and nine in the anal, back speckled with minute dots.*

Spec. O. maculatus, J. M. t. 57. f. 6. Journ. A. S. vii. t. 56. f. 6.

Mouth situated on the lower surface of the head, small shapeless spots irregularly distributed over the body, but not on the fins, scales minute. D.11: P.18: V.10: A.5: C.19.

HAB. Mountain streams at Simla, elevated between 5000 and 6000 feet where it was found by Dr. Macleod.

Spec. O. progastus,† J. M. t. 40. f. 4. Adooe of the Assamese.

Muzzle fleshy and pointed, lips thick, somewhat pendulous and muscular, abdomen very prominent beneath the pectorals. D.12: P.13: V.11: A.7: C.19.

HAB. Rapids in Upper Assam, where it occasionally attains 18 inches length, but its flesh is believed to produce vertigo and other alarming effects on those who use it.

“ III. GEN.—CYPRINUS PROPRIUS.

“CHAR. Body elevated, lower jaw short and rounded in front, lips hard, thick, and without cirri; dorsal long. Dorsal and anal usually preceded by spinous rays.

“OBS. Only two species of this group have been as yet found in India and one of these is without the dorsal and anal spinous rays.‡

Spec. C. semiplotus, J. M. t. 37. f. 2. Sentooree of the Assamese.

Head slightly depressed, with a single row of large mucous pores extending horizontally in front of the snout, back gibbous, thirty-two scales above the lateral line, and ten in an oblique row from the base of the ventrals to the dorsum. D.27: P.16: V.9: A.9: C.19.

HAB. The rapids of the Bramaputra in Upper Assam. Usual size 1 foot to 1½ in length.

* This may probably prove to be *O. guttatus*.

† Προγαστως, that has a prominent belly.

‡ They have little affinity to each other; in *C. semiplotus*, the head is small and fleshy, so as to conceal the opercular plates, and in *C. catla*, it is large with naked opercula.

Spec. C. catla, Buch. P. G. t. xiii. f. 81.

Head large, forty-four scales along the lateral line, and fourteen in an oblique row from the base of the ventrals to the dorsum. Dorsal and anal without spinous rays. D.18: P.18: V.9: A.8: C.19.

HAB. Fresh-water rivers and ponds in Bengal and Assam. Ordinary size from $1\frac{1}{2}$ to 3 feet in length, but occasionally it is found twice that size.

"IV. GEN.—GOBIO.

"CHAR. The dorsal is placed over the ventrals, and like the anal short and without spines, lower jaw shorter than the upper, and is either round or square in front, lips thin and hard, snout prominent.

"OBS. The Gudgeons thus defined are a very natural group, remarkable for the extraordinary length of the abdominal canal. One of the only two indicated by Cuvier from Buchanan's species, is an *Opsarion*, a genus no less remarkable for the shortness of the abdominal canal than the Gudgeons are for its length; but as the distinctions on which the subdivisions of the family are here made, have not before been observed, we cannot be surprised, that it should be repeated in the last edition of the *Regné Animal* from Linnæus, that the stomach of *Cyprinide* "is continuous with a short intestine." The following five species have each two cirri.

Spec. Cyp. mrigala, Buch. t. 38. f. 1. P. G. t. 6. f. 7.

Length of the head to that of the body as one to four and a half, depth of the body about one-fourth of the length, forty-four scales along the lateral line, and fourteen in an oblique line from the base of the ventrals to the dorsum. D.16: P.17: V.9: A.8: C.19.

HAB. Rivers and ponds throughout Bengal and Assam. Ordinary length two feet.

Variet. Rewah of the Natives, t. 58. f. 1.

Head less compressed than the body, upper jaw somewhat prominent, forty-three scales on the lateral line and thirteen in an oblique line from the base of the ventrals to the dorsum. D.15: P.16: V.9: A.8: C.19.

HAB. Ponds in the vicinity of Calcutta. Length from 6 to 12 inches.

Spec. Cyp. curmuca, Buch. Jour. Mys. III. t. 30.

Snout prominent and furnished with tubercles or mucous pores, lips smooth, and on each there is a small bone. D.11: P.16: V.9: A.8: C.18.

HAB. Rivers in Southern India, where it occasionally reaches three feet in length.

Spec. Cyp. reba, Buch. P. G. p. 280.

Head blunt, mouth small and directed downwards, lips soft. D.11: P.17: V.9: A.8: C.19.

HAB. Northern parts of Bengal and Behar, where it attains two feet in length.

Spec. Cyp. acra, Buch. P. G. p. 284.

Cyp. angra, id. Coll.

Cyp. Hamiltonii, Gray, Hardw. Illust. t. 86. f. 1.

Lasseem of the Assamese.

Snout prominent and fleshy, thirty-five scales along the lateral line, and fourteen in an oblique line from the base of the ventrals to the dorsum.

D.10 : P.10 : V.9 : A.8 : C.19.*

HAB. Bramaputra.

Spec. G. lissorhynchus, † J. M. t. 55. f. 5.

Snout smooth and blunt without cirri, thirty-nine scales along the lateral line, and thirteen from the base of the ventrals to the dorsum. D.11 : P.16

V.9 : A.8 : C.19.

HAB. Large Rivers of Bengal and Assam. Usual length 6 to 9 inches.

“ In the six following species the scales are thin and rough, and generally placed so that each scale is in the axis of the one immediately preceding or succeeding, and not in regular oblique rows as is usual in the family; but this peculiarity is not so well marked in some species as in others. They are all without cirri.

Spec. Cyp. bangon, Buch. Coll. t. 58 f. 2.β

Cyp. cura, id. P. G. p. 384.

Snout smooth without cirri, scales in parallel rows with a grey line between each row. D.12 : P.15 : V.9 : A.7 : C. $\frac{10}{9}$.

HAB. Bengal, where it attains a size of eight or ten inches.

Spec. Cyp. boga, Buch. P. G. t. 28. f. 80.

Snout perforated with numerous mucous pores, lower lip fimbriated, scales raised on either side of the base of the dorsal, lobes of the caudal slightly divided. D.12 : P.—V.9 : A.8 : C.—

HAB. Bramaputra. Usual length about nine inches.

Spec. G. bicolor, J. M. t. 40. f. 1.

Snout smooth, long, and rather pointed, lower jaw shorter than the upper, forty-two scales on the lateral line, thirteen in an oblique row from the base of the ventrals to the dorsum. Blue above, beneath silvery, pectorals small. D.12 : P.16 : V.9 : A.7 : C.19.

HAB. Rivers on the northern side of Assam. Griff. Coll.

Spec. G. anisurus, ‡ J. M. t. 40. f. 2.

Snout blunt, lower jaw shorter than the upper, lips hard and smooth, thirty-nine scales along the lateral line, and thirteen in an oblique row from the base of the ventrals to the dorsum, lower lobe of the caudal longer than the upper. D.12 : P.17 : V.9 : A.7 : C. $\frac{9}{10}$.

HAB. Upper Assam. Griff. Coll.

* Buchanan gives the fin rays as D.11 : P.18 or 19 : V.9 : A.8 : C.19.

† From *lissor* smooth, and *rhynchus* the snout.

‡ From *anisos* unequal, and *oura* a tail.

Variet. Cyp. bata, Buch. P. G. p. 383.

Upper lobe of the caudal longer than the lower, with an ill defined transverse bar, ventrals smaller than the pectorals. D.12: P.17: V.9: A.8: C.19.

HAB. Rivers and ponds in Bengal, where it attains a foot in length.

Spec. G. limnophilus, * J. M. t. 55. f. 3.

Scales in parallel rows, thirty-six in each row, and twelve across the body. D.10: P.19: V.9: A.7: C.19.

HAB. Ponds in Bengal. Length $12\frac{1}{2}$ inches.

"In the remaining species the scales are as usual in oblique rows.

Spec. Cyp. pangusia, Buch. t. 42. f.1. β †

Snout fleshy, porous, and prominent, forty-one scales along the lateral line, and fifteen across the body; lips fimbriated. D.14: P.18: V.9: A.7: C.19.

HAB. Bengal, where it attains a span in length.

Spec. Cyp. ariza, Buch. Jour. Mys. 111. t. 31.

Snout and under lip smooth, twelve rays in the dorsal; in other respects it resembles the last.

Spec. G. ricnorhynchus, J. M. t. 55. f. 1.

Snout thick and wrinkled, forty-three scales along the lateral line, and ten across the body from the base of the ventrals to the dorsum. D.12: P.17. V.9: A.7: C.19.

HAB. Northern parts of Bengal, here it was found by Mr. Hodgson.

Spec. G. malacostomus, ‡ J. M.

C. falcata, Gray Hardw. Illust. t.—?§

Nepura of the Assamese.

Snout thick, fleshy, and perforated with numerous large mucous pores, margins of the lips double and fimbriated. D.12: P.16: V.9: A.8: C.19.

HAB. Rapids in Upper Assam. Length from six to twelve inches. Mr. Griffith's Coll.

" V. GEN — GONORHYNCHUS.

"CHAR. Mouth situated under the head, which is long and covered with thick integuments, body long and sub-cylindrical, snout perforated by numerous mucous pores, dorsal and anal short, opposite, and without spines. The intestine and stomach form a continuous tube about eight lengths of the body.

* From *Λιμνη* a swamp or lake, and *φίλος* to love or frequent.

† Its form is not so slender as represented in the figure. Buchanan also gives seven-ten rays to each pectoral, and eight to the anal.

‡ From *μαλακος* soft, and *στομα* the mouth.

§ This plate is not numbered in Hardwicke's Illustrations, nor is it included in the list of plates prefixed to the volume.

"Obs. This genus hitherto rested on a single species long since found at the Cape of Good Hope, but the *Garra* of Buchanan chiefly belong to it, as well as several species which have since been found in India.

"The first three species are without cirri.

Spec. G. gobioides, J. M. t. 43. f. 1. *Herilwa* of the Assamese.

Altitude of the body to its length as one to four, thirty-seven scales along the lateral line, and nine in an oblique row from the base of the ventrals to the dorsum. D.10: P.15: V.9: A.7: C.19.

HAB. Bramaputra, in Assam. Length about a span.

Spec. G. petrophilus, J. M. Jour. Asiat. Soc. iv. t. 1.

Scales very minute, body and head long, eight rays in the dorsal.*

Spec. G. rupicolus, J. M. t. 43. f. 4, 5.

Snout thick and smooth, pectorals rounded;† fins short, and the membrane in which their rays are enclosed thick and opaque; thirty-five scales along the lateral line, and nine in an oblique row across the body. D.8: P.10: V.9: A.6: C.20.

HAB. Mishmee mountains. Length about two inches. Griffith's Coll.

Spec. G. bimaculatus, J. M.

Snout warty, porous, and divided by a fissure, without cirri; a black spot at the base of the caudal, lower lobe of the caudal longer than the upper, thirty-four scales along the lateral line and eight rows between the ventrals and dorsum; pectorals and ventrals lanceolate. D.9: P.13: V.9: A.7
C. $\frac{9}{10}$.

HAB. River Lacch at the foot of the Mishmee mountains, where it was found by Mr. Griffith.‡

Spec. Cyp. lamta, Buch. t. 43. f. 2. β P. G. p. 343.

Cyp. godiyava, id. Coll.

Four very short cirri, pectorals and ventrals lanceolate, and a black spot on either side of the tail, snout thick and warty. D.10: P.13: V.9: A.7
C.19.

HAB. Northern parts of Bengal, where it attains $2\frac{1}{2}$ or three inches in length.

Spec. G. gotyla, Gray, Hardw. Illust. t. 88. f. 3.

Snout thick, and divided by a deep transverse fissure in which numerous large mucous pores are situated, a fleshy pendulous point at each corner of the mouth; four minute cirri.

HAB. Mountains of India.

* The habits of this species are fully described, but we want to know more of its specific characters.

† The form of the pectorals is not accurately represented in the figure.

‡ Also at the foot of the Nipal mountains, where Mr. Hodgson appears to have found a specimen now in the Asiatic Society's collection. In this, however, the lobe of the caudal are of equal length. It is so like the succeeding variety that I have thought it unnecessary to figure it separately.

Spec. G. fimbriatus, t. 43. f. 3. β

Cyp. sada, Buch. P. G.

Four cirri little shorter than the head, pectorals and ventrals falcate.

D.10: P.—? V.9: A.7.

HAB. Northern parts of Bengal, where it attains a few inches in length.

"The remaining three have each two small cirri.

Spec. G. macrosomus,* t. 43. f. 7. β

Cyp. latius, Buch P. G. p. 346.

Depth of the body to the entire as one to six, two cirri, scales small,

D.11: P.13: V 9: A. 7: C.20.

HAB. Northern parts of Bengal.

Spec. Cyp. gohama, Buch. P. G. p. 346. t. 43. f. 6. β

Cyp. dyangra. id. Coll.

Is shorter in proportion, and more arched above and below than the former, and has eight rays in the anal.

HAB. Northern parts of Bengal.

Spec. G. brachypterus, J. M.

Lower surface of the head flat with a cartilaginous zone behind the mouth like *G. rupiculus*,† a few irregular pores on the snout, thirty-six scales on the lateral line and seven rows across the body.

HAB. Mishmee mountains. Griff. Coll."

[A coloured drawing of each species is given, together with a detailed count of whatever is known regarding it.]

RT. IV.—*Account of a Journey from Sumbulpûr to Mednipûr, through the Forests of Orissa.* By LIEUT. M. KITTOE.

(Concluded from page 606.)

I marched from Mednipûr about the middle of December of the past year, and proceeded by the regular dawk stages as far as Doodkhundi small village beyond Ghooteah, distant thirty-six miles. From this place I left the road and proceeded to Gopibullubpûr, a town on the right bank of the Subunreeka river and about eight miles due south. On first leaving Mednipûr the Cossai river is crossed (forded) and the high iron-stone formation (at the extremity of which the town stands) is quitted. The road (if it deserves such a name) passes over low land as far as the second dawk station called Chardeh, a little beyond which the iron-stone is again met with, and forms the southern limit of the level valley of the Cossai, which is throughout highly cultivated

* From *Μακρος* long, *σωμα* the body.

† It also agrees with that species in the form of its fins; the presence of two very minute cirri being my chief reason for separating them, I have not thought it necessary to give a figure.

and thickly populated; the chief cultivation appears to be rice, there however some indigo, also sugar-cane.

From Chardeh to Ektale (the 5th stage) there is but very little clear and cultivated land, consequently much jungle; a little cultivation occurs near Bajannah (the 3rd stage) also near Purooliah (the 4th). The soil is much the same as that of Mednipur, perhaps a little more sandy. Although there is so much dense jungle, there are evidences of the land having once been cultivated, and were it cleared I should think that the soil would prove rich and well adapted to the growth of cotton.

Ektale is a large village on the edge of the high iron-stone formation, here bordering what may be termed the valley of the Dolung river and (like that of the Cossai) fertile and well cultivated. There are several large villages right and left of the road towards Ghooteah which is on the high land to the opposite side of the valley, distant four miles from Ektale.

Messrs. MacDonald have an indigo factory near Ghooteah and much plant is grown on the high grounds in its vicinity.

There appears to be much low jungle to the northward of the road and a considerable belt to the southward also, beyond this towards the valley of the Subunreeka in the Dholbhoom and Maunbhoom districts (commencing near Ghooteah) the country is open and well cultivated, I remarked some very fine gram and mustard, and should think that superior wheat, barley, and flax might be grown throughout this tract, likewise sugar-cane. The scenery is very beautiful, particularly towards the southern and western horizon the Semulpal, Kussum, and Baumunghatti hills in Mohurbhunja add greatly to the beauty of the landscape, and when the broad bed of the Subunreeka is full in the rains, it must also contribute no small share of elegance to the picture.

I halted a couple of days near Gopibullubpur, which is a very large village belonging to a Gosain; a little to the northward are several other villages close together, the principal of which is Nyabussaun, which gives name to a large pergunnah belonging to Mohurbhunja. The Rajah has given it on a long lease to Messrs. MacIntosh, indigo planters, who have several factories on the Maunbhoom side of the river, one of which is opposite to Gopibullubpur; their bungalow was burnt down the night previous to my arrival. The Mohurbhunja people appear dissatisfied with the arrangements above alluded to, they seem to be averse to the cultivation of indigo, thinking that it impoverishes the land.

I wished to have advanced to the hills where the pass over which the dawk travels, is situated, but so determined were the people to prevent me, that I was obliged to alter my course. I did not lose much by it as I was enabled to survey the country along the right bank of the river and its vicinity, which had never yet been done. This portion of the Subunreeka valley is very fertile, but, to no great extent inland; undulating ground, and beds of shingle, covered with dense jungle occur, forming a belt that divides it, from the valley of the Boorabalung river, which rising in the Semulpal hills, winds under those of Kussum and Bunkatí, then flowing in a southerly direction towards the Nílgur hills under Balasore, finally empties itself into the sea near Bullramgurlí.

There is little or no fine timber on the belt of high land above alluded to; I passed over it in two marches, and entered the Boorabalung valley, then continued in a north-westerly direction to Bunkatí, the principal village of the purgunnah of Ooperbaugh. I crossed the Boorabalung which is a very clear, rapid stream, about kneedeep, with very steep banks; its course is here very tortuous, there are many rapids; I re-crossed it before reaching Bunkatí near to which place, I halted a couple of days. There are falls over some talcose rocks about a mile below the village, the spot is held sacred. The water does not fall from any great height, but the strange appearance of the rocks and the wooded banks of the stream, which above the falls is still and deep, render the scene very beautiful. The singular appearance of the rocks (talcose) is occasioned by the strata being vertical or nearly so, they lean against a totally different formation, which appears to be basalt in different stages of decomposition.

I here observed a very simple, though ingenious, way of entrapping fish. In one part of the falls, in a narrow space between two rocks, there is a long slanting thatch fastened, from the lower end of which is a fine basket work frame, slanting at a wider angle than the former, and above it; the fish in attempting to leap, fall on to the thatch and slip down to the lower part of it, from whence they cannot escape. The crafty Brahmuns impose on the people by telling them that the residing "Thacoor" or deity has the power thus to cause the fish to sacrifice themselves to him or her. The Brahmuns remove the fish early in the morning, and cook them in their "Bhog mundup" temple kitchen-house; the first dish is placed as an offering before the idol, for the consecration of the whole, which is eaten by the attendant priests, and distributed to their friends.

The village of Bunkatí is nearly deserted, as well as most others in

this fine purgunnah ; the farmers are of the Bhoomia cast ; they have been obliged to forsake the lands on account of the serious extortion and acts of injustice inflicted on them by their dissipated and ignorant chief, the Raja of Mohurbhunj. It is much to be regretted that our Government has not the right to exercise more extensive control over the tributary meahals in general, particularly over this of Mohurbhunj, in which there is so much fine land, that could be brought to favorable account. The ryots cultivate little more than what is sufficient to answer their immediate wants, knowing too well that the production and possession of more, would only afford further grounds and opportunities for their being plundered of all, it is hence that on the occurrence of a bad harvest the poorer people perish from starvation, and its accompaniment pestilence. I have been told that more than half of the population of all the jungle meahals has been swept away within the last three or four years from these causes ; judging from the scanty population, and the number of deserted huts to be seen in every village, wherever we have travelled, I am inclined to think that there is little exaggeration in the assertion.

It is scarcely necessary for me to add that it would be hazardous for Europeans to take tracts of country, (were the chiefs to give the lease of them) unless the government would protect their rights. There is an Indigo factory at Jaldá near Seersa in the Oopurbaugh purgunnah but as an instance of the uncertainty of procuring labourers, this factory was nearly at a stand still, during the present season, in consequence of the causes above alluded to, (viz. the desertion of the ryots).

Whilst touching on the subject of Europeans farming in the meahals, I must add that although the population is at present scanty and at all times its number uncertain, I feel confident that were purgunnahs taken on long leases with the guarantee of protection on the part of our government there would be (under proper and equitable management on that of the European farmers) no want of ryots of all classes, Boomiahs or Sontauls, and even Dangu from the northward, who would flock to them for employment ; the wants of these people are few, consequently labour is, and would be very cheap. The Boomiahs are a powerful and industrious race of people, they are the principal landholders in these parts. The Sontauls are an inferior class, but a cheerful race and make very good labourers. I have frequently seen eight or ten employed on the road, cheerful dragging timber carts, with one or two of them playing on a kind of flute, made of the joint of a bamboo, as an accompaniment to the song of the rest of the party.

There are a few *quallas* located here and there, they generally live together and have villages to themselves. It would be of great service if some colonies of these useful people (who are usually carriers) were induced to come from the Mogulbundí* near Buddruc and Cuttack, and to establish themselves in different parts of the road, the only obstacle to dawk travelling would then be removed. I should observe that the only sure means of establishing a good thoroughfare for both merchants and the dawk, would be for government to purchase the land on each side of the road, to the extent of half a mile each way or more, and then to allot it to the dawk runners and bearers, as well as to other persons requiring it; in a very few years every available beegah of ground would be eagerly taken, cleared and cultivated; for the first five years nothing but a nominal rent would be exacted, and ultimately it could be assessed at a low rate. The purchase would not amount to much, and some of the tracts I should think would be readily rented by Europeans, to wit the Bissai valley, which I shall presently describe.

From Bunkatí I proceeded due north for two short marches, when I reached the foot of the pass called "Nittai Maungur," or the "Tha-pooraní" ghat, from the high hill of that name, which commands it; this hill (as the name implies) is looked upon as a form of the goddess of destruction; all very prominent mountain peaks, caverns and natural curiosities in general, are deified by the benighted inhabitants of the jungles.

In the evening, I ascended the ghat, it is very rugged and steep, we lighted numerous bonfires to scare the wild beasts, and encamped for the night, in the middle of the road, the only level and clear ground we could find; the following morning we marched to Bissai, passing the Kurrumbilla dawk stage, about midway; it was here and on this occasion where I observed a break in the hills to the northward of the pass, that led to the discovery of a defile by which this valley can be entered with a scarcely perceptible ascent, I further discovered that a fine road existed, by which many years ago merchants used to travel, it is now blocked up with fallen trees, and overgrown with high grass, there are several tanks and many mango topes, one of the former is called the Brinjarah's tank. Judging from the vast number of large *peepul* and *banyan* trees of great size and age that occur by the road side, together with what information I was able to collect, I think that the road must be of great antiquity, and no doubt much frequent-

* The Mogulbundí includes most of the Purgunnahs in the plains which are under our regulations.

ed, the sites of many villages still appear. The people say that some of the former rebel zemindars of Baumunghattí blocked up this road to compel the merchants to travel by the lower valley and through the town of that name; whatever truth there may be in this, it is equally probable that the thoroughfare was closed to keep out the Marhatta plunderers towards the end of the last century. I have traced this high road as far as the Byeturní and I have no doubt that it continued on to Sumbulpúr and thence to the western coast.

I halted for the day at the village of Bissai, this place, was together with every other in the valley, destroyed by the Coles in 1834-35, it has been partly rebuilt; before its destruction it extended for near a mile in length, but like most towns in Orissa, it had no depth. I continued my march and survey up the valley by the regular dawk stages and halted for a day at Nowagaon, which place I have before mentioned. Many small villages had sprung up since my visit on my march from Sumbulpúr, but every one had suffered more or less from the herd of wild elephants, sixty in number, which infest this valley and the surrounding country; these beasts had thrown down the huts to obtain the small stores of grain, and had destroyed every description of cultivation from one end of the valley to the other. Many people had put bags of poisoned rice in their stores but the sagacious beasts were not to be caught. I was told that since a number were destroyed by a Gosain many years ago, by poison, not one has taken the bait.

Nowagaon is (as I have said before) within a couple of miles of the westernmost extremity of the valley; it has once been a large town and on the old road, the course of which is apparent from the rows of aged peepul, banyan, jaumun, mango, and other trees, there is a place near this village held sacred, it consists of the remains of a temple under a clump of enormous trees of various kinds; to the branches of one of them, are nailed numerous pieces of iron chains of various sizes, which must have been fixed there as offerings to the destructive deity, whom the poor inhabitants suppose to live in a cavern at the top of one of the high hills which tower above the valley on its north side, close to the village; they believe that at night, she comes from her retreat and with the chains fastens up her herd of tigresses for the purpose of milking them. They further relate that whenever the villagers neglect to make the usual offerings of milk, rice, and fowls, she becomes enraged and loosens some of her tigers, who never fail to carry off both men and cattle. The poor zemindar could not understand why I did not make some offering, I could not speak Ooreyah, therefore I was unable to explain the folly of such degrading superstition.

The Bissai valley is evidently a most fertile tract of country, it is about twenty miles or more in length, and averages on the whole about four miles in breadth; there are several small streams intersecting it, and one large torrent called "Korkaie" which rises in the Seemulpal mountains to the southward, and crossing the valley between Nowagaon and Junbilla, winds down its northern face, turns round the base of the Olapát hill (one of the points in the trigonometrical survey) then passing through the Baumunghattí valley continuing in a northeasterly direction, ultimately joins the Subunreeka somewhere near Ghatissla; the water of this rivulet could be made available for sugar mills.

Leaving Nowagaon I proceeded by a narrow defile towards Jushpurgurh, which place I reached in two marches. I passed the Tinderí hill (which I have already described) to my right, and found myself in another extensive valley, bounded on one side by the Buddaam range, and on the other by the lofty Seemulpal and Selma mountains. The villages here (like those of Bissai) have all been destroyed, the country has become a perfect wilderness but in the immediate vicinity of Jushpur it is open and well inhabited, the cultivation is chiefly rice and oil seeds.

Jushpurgurh is the capital of a large purgunnah of that name, belonging to Mohurbhunj, it is situated at the confluence of the rivulets Krère and Bundun, on a high mound between the two; the place was in former years strongly stockaded, but at present there is scarcely a vestige of the works left. The town is built round the foot of the mound.

The two rivers assume the name of Krèrebundun below their junction, where, for the distance of a mile they flow in a deep and narrow channel as far as a spot called Ram Teerut; at this place the (gneiss?) rocks stretch across a little below the level of the banks, the Krèrebundun falls over them into a tolerably deep chasm, in which there is a large circular basin; beyond it is a smaller fall into a second pool from whence the river flows over a gravelly bed by a most tortuous course, till it finally empties itself into the Byeturní a little above Motepúr. The water is considered very good, there are fish in abundance, a very fine Mahasír was caught and brought to me. The mode of fishing here is curious, a net is let down and placed in a circular manner, several persons ply about in canoes and keep tapping the rocks at the bottom with long poles to frighten the fish from under them, the two ends of the net are gradually closed, it is then drawn up and the fish taken out.

There are the remains of a small temple beside the falls, also several strange marks in the rock caused originally by the water: some are

in the shape of a man's foot, others of the hoof of a cow, all have been improved by human skill, and the priests assert that the forms are the marks of Ram and Seeta's feet; and the latter those of "Nandi the bull of Siva.

In examining the nature of the rock and of the shingle bed, I discovered beautiful specimens both of the common and of the precious green serpentine, the natives say it is washed from a small hill above Jushpúr, it is a most beautiful mineral and would make very elegant mantel-piece ornaments; I sent a man to bring me a large quantity, but he never returned.

From Jushpúr I marched through an interminable forest for four days, being misled by the roguery of the zemindar, and the obstinacy of my guard and other attendants. I passed the site of many large villages, and over vast tracts of grass, elephant-high, growing on land where once luxuriant crops had smiled, but all is now a wilderness.

The forest has no underwood, every inch of the land could be cultivated. I left this wilderness, at Sukroorí a large Sassun village near the high road, and which I have mentioned in a former page, it belongs to a junior branch of the Mohurbhunj family styled "Burkonwur," who hold the purgunnah of their kinsman the Mohurbhunj Raja.

We had the misfortune of being overtaken by rain (which set in on the 12th January,) the first march from Jushpúr. We had great difficulty in procuring supplies, and were much tormented by the chicanery of the Zemindars, who were evidently acting under the Raja's orders; the rain fell daily, not a dry spot could be found, consequently every person suffered more or less, sooner or later; we were more fortunate at Sukroorí where there was good ground and plenty of shelter. The natives of the country seemed to take it very coolly, they always construct bowers under shady trees in the centre of which they set fire to huge logs of dry or rotten wood, which are kept constantly burning. At night, all hands sleep in a circle round the fire with their feet towards it, few have any clothing beyond a small piece of cloth, which answers at once the purpose of a dhotí, a covering sheet, and a bag to tie up their store of rice. I am inclined to think that there is a virtue in the dense smoke which is kept up, that it dispels malaria.

We halted three days at Sukroorí, but the rain not clearing, I deemed it expedient to order a move and marched to Gobindpur, the place where I had encountered the fearful tornado on my march from Sunbulpúr, thinking it better for my followers at any rate, to have the advantage of the good water of the Byeturní, I was however mistaken, the incessant rain caused almost every person in camp to catch

ngle fever; for several days I had barely a servant to attend upon me, was forced even to pitch my own tent, I soon followed the general example likewise my family, for our tents were saturated as well as the ground, which being soft caused the pole to sink into it; not a dry spot was to be found. I broke ground and moved to Phoolkonlaie, where the soil was better, but the fever was too much rooted in all, for a change to be of any benefit; after passing many days in this unhappy state, I resolved on retreating the best way we could to Bednipur, which station we fortunately reached on the sixth day; the change restored us.

A few remarks on the climate of these tracts, and the apparent causes of sickness may be acceptable.

While at Phoolkonlaie stretched on my back with fever, I observed that the wind below was blowing in a different direction from what was above, which latter was westerly with a clear sky, we were enveloped in clouds and mist, with variable wind from an easterly direction; this atmosphere, if I may so term it, appeared to extend to the height of the level of the mountain tops, viz. about 1600 feet. The tract of land extending between the Buddaum and Keunjur hills, a span of 50 miles, is considered very unhealthy by all, may it not then be attributed to the absence of free and variable currents which in other more open tracts dispel the earth's vapors and prevent an accumulation, which must be the real cause of sickness? as long as the ground is dry there is less danger, but a single heavy shower followed by cloudy weather causes the poisonous vapor to rise, and there is no escaping its evil effects.

I have here described one cause of fever, but there is another of an opposite nature, viz. the intense heat of the country in the months of May and June, after every particle of vegetation has been consumed by fire. From the description I have heard of this fever I should imagine it to be of the brain; the patient with little warning is seized with a shivering, violent head-ache, and vomiting, delirium quickly follows, and in three days death puts an end to his miseries; natives and Europeans suffer alike from this scourge, for a more particular account of it, I would beg to refer my readers to Mr. Motte's Journey to the Diamond mines, alluded to in a former page.

Before I take leave of my readers, I will offer a few remarks on the products of the forests; of these the tussur silk is the most common; and at the same time, most valuable. Lac is also to be found; the production of both in large quantities might be effected, particularly the former.

The tussur worm is reared on the *assena* trees (*Terminalia alata* to *mentosa*) which are left standing wherever the jungle is cleared and their branches are kept lopped to a certain height, the more easily to allow of collecting the cocoons, great quantities of which are also found in the forests; they are mostly bartered to the merchants from the plains, but some are spun and wove into coarse pieces for the wealthy ryots and zemindars of the country.

The lac insect is said to abound in the Nursinghur district, north Dholbhoom, it has lately been imported and propagated in that pergunnah. It thrives on the *peepul* "*Ficus religiosa*" also on the *kussur*.

Those people who collect lac and attend to its culture, have certain superstitious rules, which they strictly adhere to, thinking that the slightest neglect will displease the patron deity and cause failure. They believe that there are certain quarters of the moon, and certain days, on which the insects taken from the parent stock must be spread on the trees, the persons who perform this office abstain from food or drink, neither do they wash nor perform any of nature's functions; there are other minor rules which I cannot recall to memory.

Dhoona (the resin of the *sâl* tree) is collected in considerable quantities, and likewise bartered.

I believe that very few deer hides and horns are collected in the parts of Orissa, although there is no scarcity of ruminants of various species, amongst which are the formidable Gowrí Gaw (*Bos gaurus*.)

The forest abounds in fine timber, but unfortunately the largest and soundest trees are usually found in the most inaccessible glens. The *Tendoo* or bastard ebony grows to a great size and is very common; some trees produce very fine logs, and of any length, large quantities of this wood rough wrought in thin bars of from two to three feet in length, are exported to Mednipur where they are sold to the turners and converted into rulers, walking clubs, and hooka pipes, and ultimately sent to Calcutta.

There are many kinds of wood which I have no doubt would answer well for furniture purposes, that of the *nux-vomica* in particular, as no insect will go near it, not even the white ant, it is hard with rather a fine grain and pretty colour; the tree grows to a great height and size.

A small quantity of "*Kuth*" (*catechu*) is prepared from the *Krè* "*mimosa catechu*" but not for exportation.

The *pullas* (*Butea Fundosa*) grow in the Keunjur jungles in greater numbers than in those of Mohurbhunj, and if there were a sale for the gum, no doubt the people would collect it.

There are many trees the seeds or nuts of which yield good oil, the *khwa* or *mowl* (*Bassia latifolia*) in particular is very plentiful. Having enumerated all the jungle products which came under notice, I must now add that for Europeans to traffic in any, it would be advisable to establish a mart at Kumererha on the Subunreeka, a large village through which the road passes, it is in the Dholbhoom pergunnah belonging to the Raja of Ghatsilla, it is nearly opposite to Tersa in Mohurbhunj, where there has long been a weekly mart held on Tuesdays; this would soon give way to any new one established on the Dholbhoom side, as property is more secure. There is an indigo factory near the village, belonging to Messrs. Macdonald, the situation is far from unhealthy for there is no heavy jungle very near the place, it is under the influence of the sea breeze which blows up the valley of the river. The hot weather is also rendered less oppressive from the frequency of severe thunder storms, which are attracted by the adjacent hills, they are generally accompanied with showers of rain and hail. The country as I have before said, appears very fertile particularly the lands of Dholbhoom, very good sugar is produced, and I should think that the Mauritius cane would thrive on some of the gravelly jungle tracts, the soil of which remains moist a few inches below the surface. The white ants would be the greatest drawback. I must now conclude, trusting that ere long, British industry and capital will be profitably employed in the jungle mehauls to the benefit of the merchant and of the now unhappy ryots upon whom the light of civilization has not yet dawned.

M. K.

RT. V.—*Note on a pillar found in the Ganges near Pubna, and of another at Kurra near Allahabad.*—By Lieut. M. KITTOE.

The elegant pillar represented in the accompanying plate, Fig. 1. (together with three others) was found a few months back in a chur, (sand bank), in the Ganges near Pubna, and sent to the Asiatic Society, by Mr. Allen of the Civil Service. I requested that gentleman to give me any information he might be able to obtain, to enable me to judge, whether these elegant pieces of Hindú sculpture had been sunk there by accident, or whether they might not have formed part of some temple existing on the spot, previous to the River having taken its present course; the following is the reply he has favoured me with—

“It was found with three others exactly of a similar kind (one of which has been slightly injured), embedded in a chur on the Ganges

about four miles from this station (Pubna); the end of one of the pillars was visible on the sand bank, and all the four were dug up very close to one another, with them were found half a dozen stones, which were not sculptured, nor of any particular size; the latter seem to me to have been a part of the pavement or steps of the building."

Mr. Allen further states "on referring to Rennel's old Maps, I observe that at that time in the direction that the chur now is, there must have been a village at some distance from the river, traces of the ancient course of the Ganges are still visible about two miles and a half or more off."

On first examining the pillar it occurred to me that it had never been erected, as the capital is unfinished, and that in all probability it had been sunk by accident at a remote period, while being conveyed to some place lower down the river. I am now inclined to think that the whole may have belonged to some temple existing on the spot previous to the inroad of the river.

The pillar which is here represented is of a hard black stone, resembling basalt, but from the long action of the water and mud, its surface has become of a dirty white colour. Its height is seven feet in all, thirteen inches and a half at its base, (which is square) and ten inches and a half diameter at its summit which is circular; from the base to the second moulding, (three parts of its entire height) it has twelve sides; an exception to the more general rule, which requires the base to be square, the second division octagonal, the third of sixteen sides and the fourth perfectly circular.

The style of architecture is that of the twelfth or thirteenth century. The workmanship is remarkably good, and the group of figures representing dancers and musicians though rather rudely proportioned, have much life in them. On one of the sides is a lizard, and on another, one of which I cannot make out the meaning, unless they be merely as guide marks to the mason for facing them properly.

The circumstance of four only being found, confirms my opinion that they have supported the roof of the "Nandi Subha" or ante-room in which the "Nandi" (bull of Siva) is placed, and as the tops of the pillars are only rough hewn, it is probable that they supported a wooden roof such as are still common in the vicinity of Cuttack, where there are some of great antiquity and of most extravagant workmanship.

Fig. 2, represents the fragment of an elegant pillar at Kurra near Allahabad, which I drew several years ago, when encamped at that place. It is built into an old Mahomedan tomb of great antiquity, and

Printed at the Oriental Litho Press



evidently been taken from one of the temples destroyed during the Mahomedan invasion.

The most remarkable features are the heads, and festoons (hanging in their mouths), which is one of many instances I have seen of Hindu ornaments, apparently of Grecian origin, which I shall remark on more particularly at some future period. M. K.

LET. VI.—*Note by Messrs. Jessop & Co. of Calcutta, on the smelting of the Iron Ore of the district of Burdwan.*

To the Officiating Secretary Asiatic Society.

DEAR SIR,—The Iron Ore with which we made the experiment in smelting, was a portion of that obtained by the Coal and Iron Committee from the district of Burdwan. We smelted above half a ton of it, which yielded about 2 cwt. of Iron, or barely 20 per cent.; it could therefore be considered an Ore of little value by the Iron Masters in Great Britain.

The operation was carried on exactly according to the practice of the large blast furnaces in England;—owing however to some peculiarity in the nature of the metal it could not be brought into a fluid state, but after its reduction from the Ore, lay in a mass at the bottom of the furnace.

We were not prepared for such a result, and as we had no means of extracting the metal, we were compelled to discontinue the experiment, when the *hearth* had become full, instead of carrying it on for a day or two, or until the whole of the Ore we had at our disposal was consumed.

We have no doubt that if we could have submitted the Iron, as it lay in the furnace to the process of *puddling*, it would have been converted into an excellent malleable Iron, similar to that made by the natives in various parts of India, by whom the metal is never brought into a fluid state.—It would be interesting to ascertain whether the same difficulty, viz. the non-fluidity of the metal, was not experienced at the Porto Novo works; we have some reason to think that it was the case.

We consider it very probable, however, that after repeated experiments, conducted by persons experienced in the business, a method of treating the Ore might be discovered, by which the Iron would be obtained in a fluid state, so as to be available for the purposes of a foundry.

We have the pleasure to send you samples of the Ore before and after *calcination*, also of the Iron produced, and of the Lime-stone used in the experiment.—The latter was procured by us from Sylhet and is of excellent quality.

We are, Sir, &c. &c.

20th Sept. 1839.

JESSOP & CO.

P. S.—The following are the quantities of the materials expended ; Ore 1220 lbs. Coke 1278 lbs. Lime-stone 744 lbs.—The experiment occupied about twenty-three hours.

ART. VII.—*Note on the habits of the Coel, and on the discovery of Isinglass.*—By MAJOR DAVIDSON.

To the Secretary to the Asiatic Society.

SIR,—Happening to stand in the veranda of my bungalow, a few days ago, I heard a loud chattering noise on the lawn ; believing that a young crow had fallen from its nest I advanced to put it out of the reach of harm. Instead of a crow I was much astonished to find that an old crow was feeding a young bird of a dark brown colour, transversely striped with cinereous bars. On asking its name of a native who also saw it, he replied that it was a young Coel. I approached within a few yards and saw it receive food from the crow's bill, in the usual supplicating posture, with extended wings, and body slightly quivering. The native informed me that the Coel never made a nest but always took possession of that of a crow, by whose incubation, its eggs were hatched ; and also, that the crow invariably continued to feed its adopted nestling, until it could shift for itself. From having seen this I can have no doubt of its truth. A few days ago the neighbouring mango topes, resounded with the plaintive notes of the Coel but at present they are not to be heard from which I am inclined to believe, that like the Cuckoo it is a bird of passage. It is a curious coincidence that they should both rear their young by practising a similar imposition on other birds. Is this common to the genus?

Observing in your 87th number that Mr. McClelland states, that "The very valuable production, *Isinglass*, has been recently found "to be yielded by one of the fishes of the Hoogly."

I beg to mention that on the 18th of June, 1820, while residing at Sooltanpoor, Oude, in a bungalow on the banks of the Goomty, I addressed a letter to that eminent naturalist the late Major General Hardwicke, acquainting him that I was in the habit of opening every

large fish of the genus *Cyprinus* that was brought for sale, and extracting the air bladder, from which I made Isinglass. While residing at Calpee, on the Jumna, in 1832, I made a quantity large enough to fill the drawer of a writing desk, from every large fish such as *Rohoo*, *Kutta*, *Muhaseer*, and various others which were brought for sale. The weights of the pods varied according to the size of the fish, (which was never above forty pounds) from half a drachm to half an ounce. I rejected the fibrous and soaked the gelatinous coat in strong limewater for five or six days, (in the cold weather) when it was ready for use as Isinglass, and equal to any for sale. I am of opinion that the article may be found in every fish that rises to breathe, whether whale, grampus, porpoise, shark, &c.; that the quantity will depend on the size of the fish, and the quality be found nearly similar in all.

I am Sir, &c. &c.

S. C. DAVIDSON.

Allahabad, 15th Sept., 1839.

ART. VIII.—*Note on the Scapes of Xanthorhæa and Fossil Stems of Lepidodendra.*—By Lieut. N. VICARY.

To the Secretary to the Asiatic Society.

I have the pleasure to send you some remarks on the resemblance, existing between the stems of "*Xanthorhæa*;" a native of New South Wales, and the fossil stems of "*Lepidodendra*." It is an object of such great interest to trace any affinity between fossils and existing species, that I make no apology for obtruding my rough note upon you, and asking you to publish it.

Xanthorhæa belongs to the tribe *Asphodeleæ* and is well known in N. S. Wales under the name of "Grass Tree," the naked flower scapes rise to ten or twelve feet in height, from the bosom of a tuft of grass like leaves, and are used by the Aborigines as shafts for their spears, for which they are well suited from their lightness and strength; there are seven species described, some of which do not form a distinct stem, and others form a stem often eight or ten feet in height, and occasionally branched in an irregular manner, not symmetrical as in *Coniferæ*, from which in the fossil state, that alone would be sufficient to distinguish them—they have no true bark, but as in *Cycadææ* an outer coat formed by the bases of the fallen leaves, the coat is from one to two inches in thickness, rough outside, but becoming smoother on the older parts, exhibiting the bases of the leaves, arranged in quin-

cuncial order, their very bases become accreted within into a false bark of considerable strength—the outer coat is with difficulty separated from the fresh stem for the purpose of examination, but in old and partly decayed stems, is easily detached and gives a clear view of the inner surface. I found some stems quite hollow, the woody core having decayed and disappeared, the cortical portion contains a large quantity of resin with the appearance and colour of Gamboge, which is perhaps the cause of its preservation, this resin is also found abundantly on the ground round the base of the plants, and I believe is for the most part exuded on those occasions when the grass is set on fire to, a practice resorted to in N. S. Wales as in India, for the purpose of destroying the more rank kinds of vegetation—the inner surface of the false bark is densely covered with lozenge-shaped areolæ arranged in a quincuncial manner—the transverse diameter (with respect to the axis) is the longest—the woody core exhibits impressions of similar areolæ, a point rises in the middle of each, which is received in a corresponding hollow in the areola of the outer coat—it appears in fact as if the outer coat was a mould in which the wood was cast. At the base next the crown of the root is thickest, rounded and blunt, the shaft is often irregular in thickness with a strangulated appearance owing perhaps to those seasons in which the growth of the plant was retarded. I regret having neglected to examine a transverse section of the wood, and cannot recollect any thing peculiar about it unless its coarse and loose grain.

The above imperfect note exhibits several points that quadrature with the descriptions given of some *Lepidodendra* and I send it to you chiefly for the purpose of drawing the attention of those who feel an interest in such things to a further and more complete investigation of the subject. It was my intention to have brought some stems to Calcutta and to have followed up the inquiry with the assistance of some person more competent to the task, I however was unable to do so. It would be easy to procure them from Sydney, as there are many very large trees flourishing at about two miles to the South of it, small ones are to be had everywhere.—The resin mentioned above has been sent to England, and found to be useful to coach makers as a varnish.

I am Sir, &c. &c.

N. VICARY, 4th Regt. N. I

ART. IX.—*Proceedings of the Asiatic Society.*

(Wednesday Evening, the 2nd October, 1839.)

The Right Rev. the LORD BISHOP of Calcutta, Vice-President, in the chair.

The Proceedings of the last Meeting were read and confirmed.

Captain J. W. BIRCH was proposed by Dr. O'SHAUGHNESSY, seconded by the chairman.

Mr. E. K. HUME was proposed by Mr. STOCQUELER, seconded by the officiating secretary.

Read a letter from the Secretary of the Royal Institution of Great Britain, acknowledging the receipt of copies of the Journal of the Asiatic Society.

Read a letter from Messrs. W. H. ALLEN and Co., Book Agents of the Society in London, forwarding account sales of the Transactions and Oriental publications, together with a statement of books supplied by them to the Society, exhibiting a balance of 16*l.* 12*s.* 2*d.* in their favor.*Library.*

Read a letter from J. VAUGHAN, Esq. Librarian, American Philosophical Society, forwarding the following books for presentation to the Society :—

Transactions of the American Philosophical Society, vol. 6th, part 2nd., New Series.

Memoir of Dr. P. S. PHYSICK, by J. RANDOLPH, 1 vol.

Proceedings of the American Philosophical Society, Nos. 3, 4, 5, and 6.

Medical Statistics from 1821 to 1830, by G. EMERON, Esq.

Read a letter from Mr. J. AYDALL, forwarding for presentation a copy of an Armenian and French Grammar.

Read a letter from H. T. PRINSEP, Esq. Secretary to the Government of India, forwarding 50 copies of the Rev. W. TAYLOR's examination and analysis of Colonel LACKENZIE's Manuscripts.

The following Books were presented :—

Bulletin de la Société Géographique, vol. 10—*by the Society.*Proceedings of the Geological Society, Nos. 60 and 61, with a list of its Members—*by the Society.*Proceedings of the Committee of Commerce and Agriculture of the Royal Asiatic Society—*by the Society.*Transactions of the Society of Arts, &c. vol 52, part 1st.—*by the Society.*Crisp's observations on the abolition of the Impress System in two letters, addressed to J. W. COOPER, Esq.—*by the Author.*

Ditto, Treatise on Marine Architecture.

Notice Historique sur la vie et les Voyages de René Caillie, par M. Jomard, Paris, 1839.

L'Inde Française ou collection de dessins Lithographiés, représentant les Divinités, &c. &c. des peuples Hindous qui habitent les possessions Françaises de l'Inde, et en général la Cote de Coromandel et de Malabar, par M. J. J. Chabrelie, avec un texte explicatif, par E. Burnouf et E. Jacquet. Paris, 1827 et 1835. Tome 1st and 2nd, folio, 2 copies—from the Government of India.

Recherches sur les Ossemens Fossiles, par G. Cuvier, 4th edition Paris, 1837, 8vo.

Atlas, a ditto ditto, en Livraisons.

Le Regné Animal distribué d'après son Organisation, par G. Cuvier, Paris, 1835, Liv. 49 Molusques, 10mo. Liv.

Compendium Logicæ—*presented by the Bishop of Isauropolis.*

The following books were received from the Booksellers:—

Royle's Illustrations of Botany, part 10th.

Lardner's Cabinet Cyclopædia; History of England.

Alif Leila, 5 copies—*subscribed for by the Society.*

The Officiating Secretary laid before the Meeting the Second Part of the 19th v of the Transactions of the Society.

Mr. BOUCHEZ, the assistant Librarian of the Asiatic Society, submitted to the Meeting a Manuscript Catalogue of the Society's books, with a request that it be printed. Resolved—That the Catalogue be referred to the Committee of Papers.

SHAH KABEER UDDEEN laid before the Meeting a Manuscript copy of the *Zee Bahadur Khanee*, with a request that the Society would join him in paying half the expense of its printing, on the same footing as it has done towards the printing of the *Sharya ul Islam*.

Resolved—That a Committee be formed consisting of Mr. H. T. PRINSEP, Mr. J. C. C. SUTHERLAND, Mr. JOHN CURNIN, Mr. JAMES MIDDLETON, and the Rev. H. PRATT, to report as to the merits of the work.

Museum.—Note by Dr. McClelland:—

"Skeletons, presented by the King of Oude, of an Elephant, of a Camel, and of a Tiger. The first has been indifferently prepared and worse treated, the cartilages and apophyses are detached, the former as well as some of the caudal vertebræ, and the last range of tarsal and carpal phalanges are altogether wanting.

The Camel, otherwise a valuable addition to our Museum, wants the entire caudal vertebræ, together with two pieces of the sternum, anterior part of the jaws, and corresponding teeth, together with some of the tarsal and carpal phalanges, cartilages of the ribs, &c.

The Tiger wants two caudal vertebræ, a femur, and twenty-two phalanges of the tarsus and carpus.

Skeleton and skin of a Kangaroo prepared from a specimen presented by Mr. H. T. PRINSEP.

The skin of a Boa, twenty feet long, presented by Ensign R. W. BIRD, 4th Regt. N. I. with the following note from the Hon. Mr. WILLIAM WILBERFORCE BIRD.

'I have the pleasure to forward the skin of a Boa, which I have been requested to present on the part of Ensign ROBERT WILBERFORCE BIRD, of the 4th Regt. N. I. for the Museum of the Asiatic Society.

When the Boa was shot, it measured 21 feet, in length. It had swallowed a spotted Deer, which was taken out of the inside, not too much decomposed for the spots in the skin to be quite distinct. Where the Deer was, the skin measured three feet one inch across.

(Signed) W. W. BIRD.'

An adult specimen of *Artonyx* from Assam where they are common, presented Captain JENKINS, and the more valuable as that in the Museum appears to be a young ungrown animal."

Oriental Publications, Antiquities, &c.

Read a letter from J. MUIR, Esq. recommending to the Society to procure a copy of the *Pseudo-Vedas*, composed by the Romish Missionaries on the Coromandel Coast,

Seharunpoor, August 13th, 1839.

MY DEAR SIR,—I last year wrote to Mr. PRINSEP and the Rev. Professor MALAN, Secretaries to the Asiatic Society on the subject of the *Pseudo-Vedas*, composed by the Romish Missionaries on the Coromandel Coast, in the hope that copies might be taken by the Asiatic Society to procure from Madras or elsewhere a manuscript copy of the work, for their own library. I now take the liberty of addressing you on the same subject, and of offering the sum of 25 Rupees towards the purchase and transcription of the manuscript, if the Asiatic Society of Bengal see fit to adopt any measures for this purpose.

The Society has already admitted into the 14th volume of its Researches a Dissertation on the subject of these *Pseudo-Vedas*, and the literary interest attaching to them, I think, sufficient to justify this application to the Society, to take steps for rendering them accessible to its members. It seems, at the same time, to be desirable that the reasonings of the Romish Missionaries on the subject of their discussions with learned Hindoos should be brought within the reach, and made available for the use of those who are labouring to promote the same cause at the present day.

I remain, My dear Sir,

Yours faithfully,

J. C. C. SUTHERLAND, Esq. }
Secy. As. Soc. Bengal, &c. &c. }

J. MUIR.

Resolved—That the Secretary be requested to address the Rev. Dr. WILSON of Bombay, soliciting his aid in obtaining a copy of the work.

Read a letter from L. WILKINSON, Esq. urging the printing of the *Siddhants*.

To W. B. O'SHAUGHNESSY, Esq.

Officiating Secretary to the Asiatic Society, Calcutta

SIR,—I have the pleasure to forward to you by Dawk Bhanghy four copies of a very admirable little disquisition on Caste, by a learned *Buddhist* of olden times, who exposes the weakness of the arguments on which the institution rests, in a most consistent manner. I beg you will be so good as to present one copy in my name to the Society, and accept another for yourself.

The other two I beg you will present to any gentlemen most interested in exposing the evils of the institution. They will no where find arguments of a like cogency to native's apprehension. They will do well therefore in studying the work.

You shall be very much obliged to you if you will let me know what your Society thought of my proposition for printing the *Siddhants*, the *Gruhyn Laghuvu* with *Ullaris Teeka*, and the *Rekhu Gunit*. Since I wrote to you I have been favoured by some friend unknown to me, with a copy of the *Beeja Gunit* or *Algebra* of the *ancient Acharyu* printed at Calcutta, thus only three instead of four works remain to be printed. I lately submitted a proposal to Government and also to the Agricultural Book Society to the like effect, as I did through you to the Asiatic

Society. The Agra School Book Society are most anxious to get these works printed and Lord AUCKLAND I understand received the proposal favourably. By all parties agreeing to take a certain number of copies, the share of the expense on each will too trifling to deserve consideration.

Believe me, My dear Sir,
To be yours very faithfully,

L. WILKINSON.

Resolved—That the subject be referred to the Committee of Papers.

Read an application from NEEMCHAUND SHEEROMONEE, demanding remuneration for correcting the proofs of the *Mahabharata*.

Resolved—That the application be referred to the Committee of Papers.

Physical.

Read a letter from Messrs. FRASER, MACDONALD and Co. forwarding a claim Mr. W. SCOTT of Singapore, for Co's. Rs. 240-3-9 for expenses incurred by him keeping the register of the tides of that place.

Resolved—That the Society recognize and discharge this claim in question.

Read the following letter from Mr. SCONCE regarding some Geological specimens forwarded to the Society.

MY DEAR SUTHERLAND,

I am despatching to you some things that look like Geological specimens and from the circumstances under which they were found, what I infer to be relics of some of the ancient epochs which mark a Geologist's History of the world. The largest and most important—if it be real—of the specimens, seems to be the remains of an animal of the turtle kind; though in a much larger scale than the modern turtles or tortoises. The size however will not disprove identity, if there be other marks sufficient to guide the judgment of one acquainted with Natural History. Not knowing anything of such matters, am merely led by the appearances which the specimen exhibits of animal conformation—the shape and relative position of the parts and the peculiar marks of some of the parts are such, as not I think, to be inanimate concretions accidentally formed in a sand hill. The specimen was broken before I discovered it—and I sent my gardener with insufficient instructions to dig out the remainder. He brought me consequently a heap of fragments, and what I send you are such parts as I could put together. I have packed the pieces in such a manner that you will be able, I dare say to trace the form they assume. When put together they form two distinct portions, and of these I shall enclose pencil sketches that will help you to "pick up the pieces." I send also several unconnected bits of the specimen; in one of these you will detect distinct traces of a claw—and in another what looks like a paw in relief. In this latter you will observe corroborative evidence of animal existence in the evident delineation of five fingers or toes, and also marks of spurs or nails. I send also in another box an entire fragment—that is, a portion just as it lay in the hill. My idea of the specimen is that it exhibits the external form of the animal, and the fossilization as we now see it, was effected during, or as a consequence of, animal decomposition. I cannot detect how far the hardened material may be a type of the—so to call it—turtle shell. The last specimen I have mentioned will shew you that the fossil was, as it were, a case or mould—enclosed in a white sand. Externally it was included in a stratified deep brown sand hill, to a depth of forty or fifty feet below the surface.

I also send a piece of charred wood, I found it in a position which makes me attach to some importance. I discovered it in a bed of firm blue clay beneath successive strata of sand and clay, and some twelve or fourteen feet from the surface. The site externally is a swelling hillock. But the most extraordinary circumstance attending this specimen is, that while it was imbedded in and beneath strata that must have been deposited while the surface was exposed to repeated inundations, if not uninterruptedly overflowed, there are what I take to be undoubted marks of heat and fusion—not merely in the wood being charred—but in a *fused crust* an inch or two above where the wood lay. This crust generally speaking is not the thickness of two rupees: but is spread as regularly as any of the layers of clay and sand. I observed however that it seemed to *run* as fused matter generally does, making its way into crevices, and gathering into a mass. But what satisfies me more strongly of the fused origin of this crust, is that just above the charred wood—an inch or two,—it appears to have *rickled* in a state of fusion *through* the clay, making a hole for itself scarcely a quarter of an inch wide. I send specimens of the clay, the crust, and of that portion of the clay, through which the fusion ran. I suppose that the heat from the fused liquid above was sufficient to char the wood. Willing to send you the specimen as entire as possible, I have not scraped it or cleared it so as to ascertain the appearances of the wood.

There are also some smaller specimens of what I suppose to be quondam shell-fish. One I am told is a *muscle*—if a shell, it is at all events a bivalve: the two shells separate—and the one is flossy looking. These shells I found also in a strata of clay and sand more or less hard—and it seems odd, that when broken, they emit a strong *sulphureous* smell. I am too ignorant on such subjects to know whether these things have any value; you will judge when you see them, and if worth while, I should be glad, if you offered them to the Society.

I am
Yours very sincerely,
A. SCONCE.

Before the Meeting broke up Dr. O'SHAUGHNESSY, exhibited several Photogenic drawings prepared by himself, and in which a solution of gold was the agent employed. A more detailed notice of the experiments described will appear in a subsequent number.

[We cannot dismiss the subject of the Proceedings of the October Meeting, without adverting to their having been distinguished by the first exhibition in the Society's annals of Colonel M'LEOD's, magnificent model of the Nizamut Palace of Moorshedabad. We strongly recommend all those who can value a first rate practical lesson in classical architecture to visit this triumph of taste and skill. Aided by the "Report by the Surveying Committee," published in our last number, the visitor can acquire by an hour's study more correct ideas on some of the noblest features of the Orders observed in this structure, than he could derive by any amount of study, from books or plates, or could gain without great difficulty, even from the building itself.—EDS.]

Day of the Month	Moon's Phase	Minimum Temperature observed at Sun-rise					Maximum Pressure observed at 9 a. 50 m.					Observations made at Apparent Noon							
		Barometer	Of the Mercury	Of the Air	Of an Evapg. Surface.	Wind	Aspect of the Sky	Barometer	Of the Mercury	Of the Air	Of an Evapg. Surface.	Wind	Aspect of the Sky	Barometer	Of the Mercury	Of the Air	Of an Evapg. Surface.	Wind	Aspect of the Sky
1		29.694	81.7	83.0	79.7	Calm	Nimbi interspersd	29.658	82.0	83.0	82.0	S.	Nimbi interspersd	29.610	82.5	83.9	82.0	S.	Cloudy (Nimbi.)
2		650	81.0	80.0	79.5	Calm.	Nimbi Raining	700	81.5	82.7	81.6	S.	Nimbi interspersd.	680	82.0	82.9	81.5	S.	Cloudy.
3		720	81.0	80.0	79.5	Calm.	Cumulo-strati on the hor. zen	769	83.5	87.5	81.8	S.	Light Nimbi and Cumuli.	766	84.9	87.9	83.5	S.	Cloudy Lt. Nimbi zenith Clear
4		716	81.5	81.0	79.9	Calm.	Cirro-strati and Haze.	780	84.6	88.2	84.5	S.	Cumuli.	770	86.2	90.7	85.2	S.	Cumuli.
5		716	81.9	81.2	80.8	Calm.	Clear Cloudy on the Hor	743	85.5	88.5	83.2	S.	Cumuli.	718	85.5	88.9	84.0	S.	Cloudy.
6		684	81.5	80.0	79.5	Calm	Clear	740	83.9	87.0	83.0	S.	Cirro-strati & Cum. zen. clear.	721	85.3	89.0	83.2	S.	Partial Haze, & detached clouds zenith Clear.
7		756	81.6	80.0	79.7	Calm.	Cirro-strati.	818	81.0	87.0	83.5	S. E.	Cumuli.	800	85.5	89.2	83.9	S.	Cloudy Cum-strati and Nimbi.
8		786	81.8	80.1	79.9	Calm.	Cirro-strati	789	83.8	87.5	84.0	S.	Cumuli.	780	84.4	88.5	84.9	S.	Cumuli.
9		740	80.8	81.0	80.0	Calm.	Cirro-strati.	769	85.7	87.5	83.5	S.	Cumuli.	783	86.0	88.0	84.0	S.	Cumuli.
10		780	81.2	81.5	80.9	Calm	Cirro-strati	827	85.0	88.0	86.5	S.	Cumuli.	827	86.4	90.5	84.4	S.	Cumuli.
11		800	81.7	80.8	80.0	Calm.	Generally Clear	870	84.4	88.0	83.0	S. E.	Cumuli.	850	87.2	90.5	84.0	E.	Cumuli.
12		766	81.5	80.0	79.6	Calm.	Clear	806	81.1	86.3	83.2	S.	Cumuli.	798	86.5	91.0	85.0	S.	Cumulo strati, and Cumuli.
13		750	81.8	80.5	80.0	Calm.	Light Cir. str. zen. Clear.	804	81.8	86.5	83.8	S.	Cumuli.	784	86.0	89.0	84.5	S.	Cumuli.
14		751	79.9	77.1	76.0	Calm.	Overcast Raining	806	82.0	82.7	80.4	S.	Cloudy.	800	84.2	87.5	83.2	S.	Cumuli.
15		750	80.5	80.0	79.8	Calm.	Cirro-strati zenith Clear	798	82.5	84.8	81.5	S. W.	Cumuli.	760	82.8	85.2	82.0	S.	Cumuli.
16		738	80.0	79.9	79.5	Calm.	Generally Clear.	783	83.2	86.7	82.9	S.	Cloudy, (Cumuli.)	770	85.9	90.0	83.9	S.	Cumuli.
17		660	80.5	80.0	80.0	Calm.	Clear.	700	84.8	87.0	85.3	S.	Cloudy.	684	86.0	87.5	85.0	S.	Cloudy.
18		631	80.0	79.8	79.6	S. E.	Clear.	680	89.7	88.9	84.7	E.	Cumuli.	657	87.0	90.8	85.2	E.	Cumuli.
19		690	80.5	80.0	79.8	E.	Generally Clear	630	89.6	87.9	84.9	E.	Cumuli.	616	87.9	90.4	84.9	N. E.	Cumuli.
20		430	79.0	77.0	77.0	N. E.	Overcast raining and squally.	446	80.5	77.0	77.1	N.	Overcast squally and hard rain.	375	80.0	78.1	77.5	N. E.	Overcast drizzly and squally.
21		426	78.5	76.0	76.0	vyh w	Cloudy.	491	80.7	81.2	78.5	vyh w	Cloudy.	499	80.7	79.5	77.5	s. w. hg	Raining.
22		612	80.5	79.0	79.0	Calm.	Cloudy	676	81.5	85.0	83.8	N. W.	Cumuli.	650	82.2	88.0	85.0	W.	Cumuli.
23		650	80.8	80.0	79.0	Calm.	Generally Clear.	700	82.2	87.0	82.5	N. W.	Clear.	700	85.7	89.0	83.0	W.	Clear, (a few detached Clouds
24		661	80.4	79.8	79.5	S. W.	To the E. Cirro-strati.	726	82.2	86.2	82.3	W.	Clear.	712	84.7	89.0	83.1	W.	Clear.
25		672	80.2	79.5	77.9	Calm.	Clear	738	82.6	87.0	82.9	W.	Clear.	732	85.4	89.6	83.2	w b n w	Clear (very few detached clouds,
26		708	80.0	78.6	77.5	Calm.	Clear	784	83.5	85.8	83.0	N. W.	Hazy.	768	85.3	88.0	83.5	W.	Cumuli and Haze.
27		700	80.2	78.8	78.0	Calm.	Clear.	759	84.7	86.5	82.8	N. W.	Cumuli occasional sun-shine	749	80.8	79.5	77.1	S. W.	Nimbus Rain. [shine]
28		704	80.0	77.5	77.1	Calm.	Clear.	766	84.1	88.4	84.3	W.	Cumuli occasional sun-shine.	750	84.9	88.1	83.2	Calm.	Cloudy (Cumuli occasional sun-
29		700	80.8	76.9	76.6	Calm.	Clear	738	84.9	87.6	83.2	W.	Cumuli.	732	85.7	88.5	83.5	w. b. n	Cumuli.
30		688	80.0	88.5	78.1	Calm.	Clear	737	83.4	87.5	80.6	W.	Clear.	729	86.7	91.0	89.1	W.	Lt. Partial Haze.
Mean.		658	80.7	79.5	79.0			736	83.6	86.2	82.9			720	84.8	87.6	83.1		

Day of the Month.	Maximum Temperature observed at 2 p. 40 m.						Minimum Pressure observed at 4 p. m.						Observations made at Sun-set.						Rain Gauge.	
	Temperature.				Wind.	Aspect of the Sky.	Temperature.				Wind.	Aspect of the Sky.	Temperature.				Wind.	Aspect of the Sky.	Upper.	Lower.
	Barometer.	Of the Mer- cury.	Of the Air.	Of an Evap- ing Surface.			Barometer.	Of the Mer- cury.	Of the Air.	Of an Evap- ing Surface.			Barometer.	Of the Mer- cury.	Of the Air.	Of an Evap- ing Surface.				
29.600	82.8	81.2	82.1	.....	S.	Nimbi interspersed	29.589	82.0	82.8	81.5	S.	Nimbus rain.	29.600	81.7	82.0	81.5	S.	Cloudy	1.24	1.33
664	82.5	83.0	81.0	.....	S.	Cloudy.	638	82.2	83.6	81.0	S.	Cloudy.	640	81.8	73.0	80.8	Calm	Cloudy.	0.26	0.30
730	84.5	87.6	83.2	.....	S.	Partial Haze	710	85.5	87.9	83.0	S.	Cumulo strati & detached clbs.	716	84.0	84.5	82.5	Calm	Cirro strati and Haze	0.13	0.43
719	83.8	84.4	83.0	.....	S.	Cloudy.	704	84.5	84.5	83.0	Calm	Cloudy.	707	83.3	83.9	82.4	Calm	Cloudy		
649	83.2	83.7	84.5	.....	S.	Generally Clear, Cum-str. on	619	86.0	89.2	83.9	S.	Haze.	657	85.0	87.0	83.2	Calm	Cirro-strati.	1.20	1.29
680	82.5	80.2	84.5	115.4	S.	Nimbi interspersed	666	85.9	89.5	81.5	S.	Cumuli interspersed to the E.	674	84.0	82.9	81.5	Calm	Nimbi, raining		
756	84.6	87.0	83.0	.....	S.	Cum. strati.	730	81.0	86.8	82.8	S.	Cum. strati	736	82.9	85.4	89.0	Calm	Cirro strati.		
756	85.3	88.5	85.5	.....	S.	Cum. str. and Cumuli	730	85.0	86.5	84.0	S.	Cum. strati	740	81.8	84.4	82.9	Calm	Cloudy.	0.11	0.11
740	85.0	87.0	82.0	.....	S.	Cumuli and Haze.	708	84.6	86.1	81.5	S.	Cloudy.	718	84.2	85.0	80.8	Calm	Cirro-strati.		
760	86.7	93.0	89.0	.....	S. E.	Cumulo strati Thunder	750	86.6	87.9	83.1	S. E.	Cirro-strati.	750	83.8	84.6	81.5	Calm	To the N. E. Cum. strati		
770	84.2	86.5	83.0	.....	S.	Nimbi interspersed.	760	85.0	84.1	81.6	S.	E. Nimbus rain.					S.	Nimbus rain & thunder	1.28	1.35
718	85.3	87.9	83.2	.....	S.	Cumulo strati and Haze	718	85.0	87.0	83.5	S.	Zen. Clear, to the N. Cum. str.	710	84.5	85.2	83.0	S.	Clear.		
748	85.8	87.0	83.9	.....	S.	Cloudy	716	83.3	86.5	83.3	Calm	Cloudy.	721	84.2	84.4	82.8	S.	Cloudy	2.33	2.45
753	84.6	89.0	83.5	113.0	S.	Clear to the N. Cum-strati.	718	85.4	87.7	83.0	S.	Cumuli.	756	83.9	85.0	82.7	Calm	On the Hor. Cum-strati		
734	83.1	86.7	82.2	110.5	S.	Cumulo-strati.	719	84.8	86.5	82.7	S.	Cumulo strati.	722	83.5	85.5	82.5	Calm	Cirro-strati.		
729	85.5	86.9	83.5	.....	S.	Cumuli	700	84.9	88.7	83.3	a. b. s.	Cumulo strati.	706	82.8	86.0	83.0	S.	Cirro-strati.		
620	86.6	90.5	85.3	115.6	W.	Cumuli	610	85.0	87.8	84.5	S.	Cumuli.	616	82.0	85.5	84.0	S.	Cloudy.		
692	84.0	84.2	83.0	.....	S. E.	Cloudy.	590	83.8	84.8	84.4	S. E.	Clouds.	598	83.0	84.4	82.2	S. E.	To the E. Nimbus	0.60	0.60
512	86.4	90.0	85.0	.....	N.	Very Cloudy	480	85.5	88.9	83.0	W.	Cloudy.	439	79.0	77.0	76.5	N. W.	Blowing a gale.	2.48	2.62
333	80.1	78.0	77.1	.....	N.	Overcast rain, & squally.	333	79.8	77.6	76.9	N. W.	Blowing a gale, with incessant	339	80.0	78.8	76.5	N. W.	Cirro-strati.	1.10	4.37
198	80.5	79.0	77.0	.....	S. W.	Cloudy	196	80.5	79.5	77.0	W.	Cloudy.	196	80.0	78.8	76.5	S. W.	Cirro-strati.		
620	82.5	83.5	85.7	.....	N.	Cumuli	608	82.6	88.1	84.6	S. W.	Cumulo strati.	618	81.8	83.5	83.9	S. W.	Cirro-strati.		
672	84.1	90.0	84.1	109.5	N. W.	Cumuli	610	84.4	89.0	83.5	a. b. n.	Clear	606	82.8	86.6	82.8	W.	Generally Clear	0.64	0.69
692	85.4	90.0	83.2	110.8	W.	Cumuli	661	84.2	88.4	83.2	a. b. n.	Cumuli.	670	83.6	85.9	82.5	Calm	Cirro-strati	0.98	1.03
688	85.5	91.2	83.0	.....	W.	Cumuli (very few.)	688	85.5	91.2	83.0	W.	Cumuli (very few.)	688	85.5	86.8	82.5	Calm	Clear.		
704	85.5	92.1	84.8	111.8	W.	Cumuli, zen. Clear.	688	85.0	90.7	84.5	W.	Cumuli, zen. Clear.	673	83.0	87.5	83.8	Calm	Cum-strati on the Hor	0.61	0.63
698	84.5	89.0	84.8	106.2	W.	To the N. & E. Nimbi, zen.	676	84.0	88.7	84.1	a. b. s.	Cum. strati on the Hor	680	82.9	85.8	83.5	Calm	Generally Clear.	0.52	0.57
710	85.6	92.5	87.2	115.3	S. W.	Cumuli zen. Clear	680	85.4	89.5	84.0	S. W.	Clear.	694	84.2	86.8	83.3	Calm	Clear	0.83	0.90
688	86.3	92.7	87.1	116.5	W.	A few Cumuli.	674	86.3	89.2	87.1	W.	Clear.	680	85.6	87.0	84.0	w. b. n.	Cirro-strati.		
688	86.3	92.7	87.1	.....	W.	Hazy	682	85.5	88.6	84.8	W.	Partial Haze.	660	85.0	87.2	84.0	Calm	Clear.		
Mean.	671	84.5	88.4	112.3			657	84.4	88.9	82.5			659	83.1	84.8	81.8			1791	1895

For use in Library only

